The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Gender Equality for Sustainable Development Goals

持続可能な開発目標がめざすジェンダー平等

9:00-17:00, Friday, October 11, 2019
Ochanomizu University

2019年10月11日（金）9:00-17:00
お茶の水女子大学　国際交流留学生プラザ

Session 1: Evaluation Systems for Gender Equality Activities
ジェンダー平等度評価システム

Session 2: Career Development Programs for Next Generations
次世代キャリア開発プログラム

Session 3: Role of Chemistry for SDGs
持続社会のための化学の役割

JNWES Japan Network of Women Engineers and Scientists
特定非営利活動法人日本女性技術者科学者ネットワーク

EPMEWSE
男女共同参画学協会連絡会

お茶の水女子大学 Ochanomizu University

JST Japan Science and Technology Agency

MEXT MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

独立行政法人 国立女性教育会館 National Women's Education Center

Contents

Welcome Message

On behalf of the organizing committee, I am honored and delighted to welcome you to the 9th Japan-China-Korea Women Leaders Forum in Science and Technology held on October 10-12, 2019 in Japan.

Women Leaders Forum started in 2008 and held every 1-2 year in one of the three countries. The forum 2019 is organized by the special committee on this forum including JNWES and EPMEWSE, co-sponsored by Ochanomizu University, supported by Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan Science and Technology Agency (JST) and National Center for Women's Education (NWEC).

The full program of the forum is as follows.

Thu.Oct.10: Arriving at Haneda Airport, move to the Hotel. Welcome Dinner.

Fri. Oct.11: Main Symposium at Multi-purpose Hall, Hisao & Hiroko TAKI Plaza, Ochanomizu University (Otsuka, Bunkyo-ku, Japan) on the theme "Gender Equality for Sustainable Development Goals".

Session 1: Evaluation Systems for Gender Equality Activities

Session 2: Career Development Programs for Next Generations

Session 3: Role of Chemistry for SDGs

Sat. Oct.12: The 17th Annual Symposium of EPMEWSE at Ochanomizu University (Otsuka, Bunkyo-ku, Japan) on the theme "Nurturing the next generation in science and technology and creating an environment".

I am proud to inform you that we have invited distinguished speakers and chairs form Japan, China and Korea. I believe this year's forum provides a great opportunity to discuss how we strengthen our trilateral cooperation and network among the women scientists in Japan, China and Korea.

Chikako Yoshida-Noro, PhD.
Professor, Nihon University
Chair of the Organizing Committee,
The 9th Japan-China-Korea Women Leaders Forum in Science and Technology

Program

The 9th Japan-China-Korea Women Leaders Forum
For Science & Technology
Ochanomizu University, Otsuka, Bunkyo-ku, Japan
October 10-12, 2019
Official Language: English
Sponsored by JNWES & EPMEWSE
Co-sponsored by Ochanomizu University & supported by MEXT, JST, NWEC

Date: Thursday, October 10, 2019
Arrival: Tokyo International Airport (Haneda) in the afternoon. Move to Sunshine Prince Hotel (Ikebukuro, Toshima-ku, Tokyo) by shuttle bus. Check-in.
Accommodation: Sunshine Prince Hotel (Ikebukuro, Toshima-ku, Tokyo)
18:30-20:30 Welcome Party at Japanese Restaurant Musashino in the Hotel

Date: Friday, October 11, 2019		
Venue: Multi-purpose Hall, Hisao & Hiroko TAKI Plaza, Ochanomizu University (Otsuka, Bunkyo-ku, Japan)		
Title: The 9th Japan-China-Korea Women Leaders Forum		
Theme: Gender Equality for Sustainable Development Goals		
Time	Program	Chair
09:00-09:30	Opening Ceremony Welcome address by Prof. Chikako Yoshida-Noro Chairperson of the 9th JCK-WLF Organizing Committee, CIT & Med, Nihon University Opening remarks by Mr. Akira Kusume Director, Office of Human Resources Development for Science and Technology, Human Resource Policy Division, Science and Technology Policy Bureau, MEXT Opening remarks by Prof. Kimiko Murofushi, President of Ochanomizu University Opening remarks by Prof, Mihoko Nojiri President of EPMEWSE, KEK Opening remarks by Ms. Ryo Kimura, President of JNWES, Sakae Design Opening remarks by Dr. Myeong-Hee Yu, President of KOFWST, KIST Opening remarks by Prof. Jihong Yu, Head of CWAST Delegation, Jilin University, Member of CAS	Dr. Hitomi Kumagai, Next President of EPMEWSE Professor, College of Bioresource Sciences (CBS), Nihon University
09:30-10:00	Coffee Break, Group Photo	
10:00-12:00	Session 1: Evaluation Systems for Gender Equality Activities	China: Prof. Mei Tian, Deputy Director, Zhejiang

10:00-10:25 10:25-10:40	Japan: Chikako Yoshida-Noro, Nihon Univ. “Assessment of Gender Equality in Academia: Promoting Activity of Female Researchers in Japan and Overseas” Yasuko Sasaki, Ochanomizu Univ. “What Promotes Gender Equality on Campus?”	Univ. Medical Center
10:40-11:10	Korea: Dr. So Young Kim, Grad. Sch. of Science & Technology Policy, KAIST “Evaluating Progress in Gender Equality in S&T in South Korea”	
11:10-11:40	China: Dr. Ruomei Li, Adviser, Former Secretary-General, Chinese Society for Electrical Engineering (CSEE) “Investigation and Analysis of the Status of Chinese Women in Science and Technology”	
11:40-12:00	QA & Discussion	
12:00-13:00	Lunch & Poster Viewing	
13:00-14:50	Session 2: Career Development Programs for Next Generations	Korea: Dr. Heisook LEE, Principal Research Fellow, GISTeR, KOFWST, Professor Emeritus, Ewha Womans Univ.
13:00-13:30	Japan: Rie Yamaguchi, JWEF “Work-Style Reform and Women's Career Promotion as a National Policy and Efforts to Practical Solutions in Companies”	
13:30-14:00	Korea: Prof. Suk Kyeong Lee, The Catholic Univ. of Korea, School of Medicine “The KOFWST’s Journey to Foster Females in STEM fields”	
14:00-14:30	China: Erfan Ju, Senior Engineer, Resin/paint Marketing, Director, GE Toshiba Silicones, Great China “Shanghai next generation female engineer career planning and success in new high technology industry”	
14:30-14:50	QA & Discussion	
14:50-15:10	Coffee Break	
15:10-17:00	Session 3: Role of Chemistry for SDGs	Japan: Dr. Akiko Itakura, Group Leader, NIMS
15:10-15:40	Japan: Prof. Maki Kawai, President of Chem. Soc. Japan, Director General, Inst. Mol. Sci. “CSJ committing to SDGs”	
15:40-16:10	Korea: Prof. Heesun Chung, Dean, GRAST, Chungnam National Univ. “Role of Chemistry for Sustainable Development Goals”	
16:10-16:40	China: Prof. Zhimin Liu, Research Fellow, The Institute of Chemistry, CAS “Green Chemistry promotes Sustainable Development”	
16:40-17:00	QA & Discussion	

17:00-17:50	Poster Session including Research Poster Presentation by Young Women Researchers 1) Junko Kogure / Megumi Furuichi, Girls' STEM Career Path Project (GSTEM-CPP) "Encouraging Teenage Girls to Choose Career in STEM Field – Report from Natsugaku (Girls' Science Summer Camp)" 2) Samira Jafari, Chemistry and Biochemistry department / Advanced Sciences, Ochanimizu Univ. "Afghan *Achillea santolina* L. essential oil extraction by conventional and microwave heating" 3) Dilinigeer Dilixiati, Maya Ueda, Toshihiro Kondo, Graduate School of Humanities and Sciences, Ochanomizu Univ. "High Electrocatalytic Activity for Oxygen Reduction Reaction of Ni and Co Core-Pt Shell Nanoparticles" 4) Sara Tode, Anna Tode "Activities of the Community of Female Student in Science" 5) SJWS "Recent Activities of the Society of Japanese Women Scientists " 6) JWEF "Japan Women Engineers Forum; History, Objectives and Activities"	Prof. Eiko Nakayama, Showa Women's Univ. Yoshihito Mori, Ochadai. Maki Iwakuma, P.E. Jp
17:50-18:00	Closing Remarks by Fusako Utsumi, President of NWEC	Yumiko Nagoh Vice president of JNWES
18:30-20:00	Banquet (arranged by JNWES) (at Ochanomizu Univ., Tokyo)	
Accommodation: Sunshine Prince Hotel (Ikebukuro, Toshima-ku, Tokyo)		

Date: Saturday, October 12, 2019
Venue: Common lecture building 1 & 2, Ochanomizu University
Title: The 17th Annual Symposium of EPMEWSE (in Japanse) ; Canceled due to Typhoon 19
Theme: Nurturing the next generation in science and technology and creating an environment
9:50-12:00 Attending the Symposium (with whisper interpreter)
Back to the Hotel
Move to Tokyo International Airport (Haneda) by shuttle bus. Departure

JNWES: Japan Network of Women Engineers and Scientists

EPMEWSE : Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering

KOFWST: Korea Federation of Women's Science & Technology Associations

CWAST: China Women Association for Science & Technology

CAS: Chinese Academy of Sciences

Opening Ceremony

Opening Ceremony Chair (Japan)

Hitomi Kumagai
Professor, Department of Chemistry and Life Science, College of Bioresource Sciences, Nihon University
Member of Science Council of Japan

Education

Degree: BS, Description: in Food and Nutrition, Ochanomizu University, Japan, 1982
Degree: MS, Description: in Food and Nutrition, Ochanomizu University, Japan, 1984
Degree: PhD, Description: in Agricultural Chemistry, The University of Tokyo, Japan, 1988

Research Field

Food Science, Food Chemistry, Food Engineering

Career History

Just after Dr. Hitomi Kumagai entered the graduate school of Ochanomizu University, she started to work as a part-time teacher at Ferris Girls' Junior & Senior High School where she used to attend. She also had experience to teach at several other high schools and colleges while studying as a graduate student.
After Dr. Kumagai finished the doctor's course of the University of Tokyo, she joined College of Bioresource Sciences at Nihon University as the second ever female faculty member after 20-year hiatus in 1990.
She was assigned to an Overseas Researcher and has been to The University of Nottingham, UK from 2000 to 2001 taking two of her children. She was promoted to Professor in 2011 after serving as Assistant, Lecturer, and Associate Professor for several years each. After commencement of the activities on gender equality through the Gender-Equality Promotion Committee in her College, the number of female faculty members has been increasing and has become 51 at present.

Certification

Teacher's License at Junior and Senior High School

Awards

Society Award by The Japanese Society for Food Science and Technology, 2016
Study on Improving Sensory and Processing Properties as well as Health-promoting Functions of Foods

Research-Paper Award by Japan Society for Food Engineering, 2008
Enhancement of Hydrophilicity of Soybean Globulins by Deamidation and Change in Their Gelation Properties, *Nippon Shokuhin Kogaku Kaishi*, 9(1), 67-73 (2008)

Ando-Momofuku Award, 2007
Study on the Improvement of Food Protein Functionality by Cation-exchange Resins

Outstanding Paper Presentation at the 95th AOCS Annual Meeting & Expo, 2004, Cincinnati, Ohio, USA
Deamidation of Soy Proteins by Ion Exchangers to Provide New Functions
- Enhancement of Calcium Absorption by Deamidated Soy Proteins –

Achievements

Dr. Hitomi Kumagai has published about 20 book chapters and 100 articles including reviews and original papers. Some of her research findings have been applied for patents, and two of them was granted as international patents.

Civic, Political, and Philanthropic Activities

Dr. Kumagai has been serving as a councilor of several scientific societies and as a refree of grant-in-aids supplied from various foundations and governments.

Science Council of Japan: Member of Section II (Life Science) (2017-): Chair of Bioscience, Biotechnology, and Agrochemistry Subcommittee (2017-); Secretary of IUNS (International Union of Nutritional Science) Subcommittee (2017-); Member of Gender Equality Subcommittee (2017-); Secretary of Life-Science Gender-Diversity-Promotion Subcommittee (2019-)

Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE): Member (2017-)

Japan Society for Bioscience, Biotechnology, and Agrochemistry: Councilor (2012-2019); Chair of Diversity Promotion Committee (Formerly, Gender Equality Committee) (2019-); Associate Editor of Bioscience, Biotechnology, and Biochemistry (2017-); Associate Editor of Kagaku to Seibutu (Society Journal of Chemistry and Biology) (2014-2017); Member of Public Relations Committee (2011-2019); Member of Female-Researcher Award Committee (2016-2018); Fellow (2016-)

Japanese Society of Nutrition and Food Science: Councilor (2006-); Member of International Academic Cooperation Committee (2008-)

Japanese Society for Food Factors: Councilor (2006-)

Japanese Society for Food Science and Technology: Member of Awards Committee (2012–2014, 2018-)

Japan Society for Food Engineering: Councilor (2007-)

American Oil Chemists' Society: Organizer of Protein and Co-Products Session in Annual Meeting (2007-)

IUFoST-Japan: Councilor (2014-)

Current Memberships

Science Council of Japan (2014-)

Japan Society for Bioscience, Biotechnology, and Agrochemistry (1983-)

Japanese Society of Nutrition and Food Science (1990-)

Japanese Society for Food Factors (1996-)

Japanese Society for Food Science and Technology (1999-)

Japan Society for Food Engineering (2000-)

Japanese Society of Applied Glycoscience (2018-)

American Oil Chemists' Society (2005-)

American Chemical Society (2006-)

Message from MEXT (Japan)

Akira KUSUME
Director, Office of Human Resources Development for Science and Technology, Human Resource Policy Division, Science and Technology Policy Bureau
Ministry of Education, Culture, Sports, Science and Technology (MEXT)

Education

1996: Bachelor of Law, the University of Tokyo, Japan
2002: Master of Law, Graduate School for Law and Politics, the University of Tokyo, Japan

Career History

1996: Policy Planning Division, Higher Education Bureau, Ministry of Education, Science and Culture
2003: Senior Specialist, International Affairs division, Minister's Secretariat, Ministry of Education, Culture, Sports, Science and Technology, MEXT
2006: Director, School Policy Planning Division, Tokushima Prefectural Board of Education
2010: Deputy Director, Child and Youth Development Promotion Division, Cabinet Office
2012: Deputy Director, Nuclear Liability Division, Research and Development Bureau, MEXT
2015: Director for Policy Planning, Day Care Division, Child and Family Policy Bureau Ministry of Health, Labour and Welfare
2018- Director, Office of Human Resources Development for Science and Technology, Human Resource Policy Division, Science and Technology Policy Bureau, MEXT

Opening Remarks (Chair of EPMEWSE, Japan)

Mihoko Nojiri
The Chair, EPMEWSE
Institute of Particle and Nuclear Studies, KEK

Education

-1990 Graduate School, Division of Natural Science, Kyoto University

-1985 Faculty of Science, Kyoto University

Career History

Oct 2007 - Today PI, IPMU, Tokyo University

April 2007 - Present Professor, High Energy Accererator Research Organization(KEK)

Jan 2006 - Mar 2007 Associate Professor, High Energy Accererator Research Organization(KEK)

Oct 1997 - Dec 2007 Associate Professor Yukawa Institute for Theoretic. Physics, Kyoto University

July 1993 - Sep 1997 Associate Professor, Nathional Laboratory of High Energy Physics (KEK)

Research Areas

Physics / Particle/Nuclear/Cosmic ray/Astro physics /

Research Interests

Theoretica. Particles Physics

Civic, Political, and Philanthropic Activities

Oct 2017 - Present Member, Science Council of Japan

Oct 2014 - Sep 2017 Associated member, Science Council of Japan

April 2017 - March 2019 Board member, the Physical Society of Japan(JPS), Chair for the committee of gender equality promotion of JPS

April 2017 - March 2021 Advisory Board member of Yukawa Institute for Theoretical Physics, Kyoto University.

April 2009 - March 2010 Advisory Committee member of ICRR, Tokyo University

Opening Remarks (President of JNWES, Japan)

Ryo KIMURA
President of Japan Network of Women Engineers and Scientists

Co., Sakae Design company
Tokyo University of Agriculture and Technology

Qualification

Professional Engineer for Agriculture 「Rural Environment」
First-class architect
First-class landscaping construction management engineer

Education

Degree: BE, Architecture , School :Musashino Art University,1976

Career Histry

1976-1978: Co.,Central consultant (Building Department)
1978-: Co.,Sakae Design Environmental improvement section
Pubulic buildings design Community- center. Pump station, Individual residence
Various Parks design Children's park, City park, Botanical garden, Disaster evacuation park
Rural environment improvement Rural Environment Management Project
Rural planning Village development Rural activation KI

Civic, Political, and Philanthropic Activities

Japan Society for Professional Engineers of Women (JSPEW) member in 2008-
Japan Network of Women Engineers and Scientists in 2015-
2011-2018：President of JSPEW
2012－：The Geo Ecological Conservation Network Audit & Supervisory Board Member
2018-：President of Japan Network of Women Engineers and Scientists

Current Memberships

JSPEW Member,
INWES member

Opening Remarks

As the President of JNWES (Japan Network of Women Engineers and Scientists), I am very proud to invite you to “the 9th Japan-China-Korea Women Leaders Forum for Science and Technology” in Tokyo, Japan.

The Forum started in Seoul, Korea in 2008 and will be the 9th this year and the 3rd in Tokyo. In the course of conferences, we picked up various issues and compared, and directly discussed them among the three countries. After repeated discussions, it was confirmed that the problems of women in all countries, especially East Asia, were similar. We also learned that it is very effective for three countries with similar tasks to learn effective measures from each other's examples. I think the face-to-face meeting is very effective

The theme of the 9th Forum is “Gender Equality for Sustainable Development Goals”. The Forum, which began with raising issues, today ... discuss future policies. Although it is difficult to improve the female environment at once, the steady efforts of female scientists and engineers overcome them.

A good example is this venue ... this Ochanomizu University, which provide the conference venue, has been established with a women's university and has 150-years history that was first established in Japan in 1874 for nurture female teachers. At that time, there were very few female teachers, so I think it was a very advanced school. Women in that era were hard on all sides. Today's Forum, I can feel the historic linking, to be able to hold such a meaningful meeting. I hope to remember,100 years later, women will look back on our this current situation and maybe says that "Women in the 100years before era were hard on all sides".

Finally, I would like to express my sincere thanks to all of the speakers, guests and attendees from China, Korea, and Japan. Also my deep thanks to all of our sponsors and supporting organizations and volunteers, for their generous contributions for ensuring this conference be a great success.
We wish all attendees to have a wonderful and memorable experience.

Ryo Kimura
JNWES President.

Opening Remarks (President of KOFWST, Korea)

Myeong-Hee Yu
President, KOFWST (Korean Federation of Women's Science and Technology Associations)
Principal Research Scientist, Biomedical Research Institute of KIST (Korea Institute of Science and Technology)

Education

Degree: BS, Dept. of Microbiology, Seoul National University, Korea, 1977

Degree: Ph.D. Dept. of Microbiology, the University of California, Berkeley, USA, 1982

Degree: MBA, KAIST Business School, Korea, 2008

Degree: LLM, Northwestern University, School of Law, USA, 2014

Research Field

The structure-function relationship of proteins

Proteomics

Cancer biomarker

Career History

Postdoctoral Fellow, the Massachusetts Institute of Technology (MIT), USA, 1982-1985

Korea Research Institute of Bioscience & Biotechnology (KRIBB), Korea, 1985-2000

KIST (Korea Institute of Science and Technology), Korea, 2000 ~ Present

Senior Secretary for the Future Strategy at the Presidential Office of Korea, 2010-2013

Awards

Mock-Am Award from the Korean Society of Molecular and Cellular Biology, 1996

L'Oréal-UNESCO Award for Women in Science, 1998

The Seoul City Cultural Award, 2001

The Role Models in Science, from the Korea Science Foundation & DongaScience, 2003

The Order of Science and Technology and the Ungbi Medal, from the Korean Government, 2004

60 Women in 60 Years History of UNESCO, 2006

Achievements

Over 120 published articles in major biochemical journals, appearing in *Journal of Biological Chemistry, Nature Structural Biology, Proc. Natl. Acad. Sci. US A, Journal of Molecular Biology, Journal of Neurochemistry, Protein Science, Journal of Molecular Biology, Molecular & Cellular Proteomics, J. of Proteome Research, Scientific Reports, etc.* Dr. Myeong-Hee Yu has spent over 30 years working on the structure-function relationship of the proteins. Dr. Yu has shown that genetic emphysema, a human

disorder resulting from alpha-1-antitrypsin deficiency, is associated with a hepatic block in the protein folding process. Since July 2002 Dr. Yu had been the Director of Functional Proteomics Center, one of 21C Frontier R&D Initiatives of Ministry of Science and Technology, to build up national infrastructure of emerging proteomics technology. In July 2010 she was appointed as the Senior Secretary to the President of Korea for national future strategy, and had served the position till February 2013. Dr. Yu had been the President of KOGO (The Korean Genome Organization), The Korean Biophysics Society, and KSBMB (Korean Society for Biochemistry and Molecular Biology).

Civic, Political, and Philanthropic Activities

Member, L'OREAL-UNESCO Award International Jury, 2001-2006
Member, The National Science & Technology Council, 2008-2010
Board Member, Korean Cancer Association, 2014-2016
Member, Scientific Advisory Board, Institute for Basic Science, 2015-2021
Chair, Committee on Women Scientists, The Korean Academy of Science and Technology, 2016-2019
Co-chair, Bioeconomy Forum of The Korean Federation of Science and Technology Societies, 2017-2020
President of the Korean Federation of Women's Science and Technology Associations, 2018-2019
Advisory Committee, National Assembly Futures Institute, 2018-2020
Board Member, KC Mirae Scholarship Foundation, 2018-2021

Current Memberships

The Korean Academy of Science and Technology (KAST), 2002- Present
The National Academy of Engineering of Korea since (NAEK), 2014-Present
Citizens' Coalition for Scientific Society (CCSS), since 2005, one of founding members

Opening Remarks (Head of CWAST Delegation, China)

Jihong YU
Academician of Chinese Academy of Sciences
Academician of TWAS, Member of Academia Europaea
Associate Editor of Chemical Science
Director of International Center of Future Science, Jilin University
Professor, State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, College of Chemistry, Jilin University

Education

Degree: BS, Description: in Inorganic Chemistry, School: Jilin University, Location: Changchun, China, Year: 1989
Degree: Master, Description: in Inorganic Chemistry, School: Jilin University, Location: Changchun, China, Year: 1992
Degree: PhD, Description: in Inorganic Chemistry, School: Jilin University, Location: Changchun, China, Year: 1995

Research Field

Synthesis and application of zeolitic nanoporous materials involving designed synthesis of new type of zeolites, developing new synthetic routes, mechanistic study and the application of zeolitic nanoporous materials in catalysis, separation and other emerging fields.

Career History

Prof. Jihong Yu is from the State Key Laboratory of Inorganic Synthesis and Preparative Chemistry, Jilin University, China, and is the director of International Center of Future Science, Jilin University. She received her BS (1989), MS (1992), and PhD (1995) from Jilin University, and worked as a postdoctoral fellow first at the Hong Kong University of Science and Technology and then at Tohoku University in Japan during 1996-1998. She has been a full professor in the Chemistry Department, Jilin University since 1999. She was awarded the Cheung Kong Professorship in 2007 and elected as the Member of the Chinese Academy of Sciences in 2015, the Fellow of TWAS in 2016, and the Member of Academia Europaea in 2019.

Her main research interest is in the designed synthesis and application of zeolitic nanoporous materials in energy, environment and other emerging fields. She has co-authored over 350 research papers including Science, Nat. Commun., Sci. Adv., Chem, JACS, Angew Chem. Int. Ed., etc.; obtained over 20 authorized Chinese Invention Patents; published 7 books. She has delivered over 60 Plenary/Keynote/Invited lectures in international conferences. From 2014 to 2018, she was recognized as the Elsevier Most Cited Chinese Researchers for Exceptional Research Performance in the Field of Chemistry. She was the winners of the National Prize for Natural Science, and the IUPAC 2017 Distinguished Women in Chemistry/Chemical Engineering Award, etc. Currently, she serves as the Associate Editor of Chemical Science, the Editor-in-Chief of Chemical Research in Chinese Universities, and Editorial/Advisory Board Members of Materials Horizons, Materials Chemistry Frontiers, National Science Review, ACS Central Science, ACS Mater. Lett., Inorg. Chem., Chem, Matter, etc. She is the Chair of Chinese Zeolite Association, and Vice President of Chinese Chemical Society.

Opening Remarks (President of Ochanomizu University, Japan)

Kimiko MUROFUSHI
Academic Name: Kimiko Murakami-Murofushi
President, Ochanomizu University

Education

Degree: B.S. in Biology from Ochanomizu University,1970
Degree: M.S. from Ochanomizu University,1972
Degrees: Ph.D. in Medicine from the University of Tokyo,1976

Research Field

Cell Biology, Biochemistry, Science Education

Career History

Joining Ochanomizu University in 1983, she became a professor, specializing in Life Science and Science Education, in 1996, after working as an Assistant Professor and Lecturer. She was appointed Dean of the Faculty of Science in 2002 and successfully coped with various issues arising from the government's initiative to turn all Japanese universities into institutions with cooperative status as a Director and Vice-President in 2004. Also, she conducted promotional activities to improve people's science literacy and supported girls' education in developing countries while striving to establish Japan's first "Genetic Counseling Course" as a graduate course. She became a Professor Emeritus in 2013, and assumed her current position in 2015. In 1999 and 2005, she served as a Visiting Professor at Université Louis Pasteur (now known as Université de Strasbourg), and received the Ordre des Palmes Académiques (the Order of Academic Palms) for her contribution to promoting interactions between researchers and students in Japan and France in 2013. Besides, she held various posts such as a Council Member of the Science Council of Japan, a working group member of the Ministry of Education, Culture, Sports, Science and Technology/Ministry of Economy, Trade and Industry/Cabinet Office, Board Member, Governors of the Japan Broadcasting Corporation (NHK), Member of the Board of Bridgestone Corporation, Auditor of the Japan Agency for Medical Research and Development, and Vice-Chairperson of the Japan Association of National Universities.

Major Awards

2011: The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology

2013: Chevalier dans l'Ordre des Palmes Académiques (from the government of France)

Research Pursuits

She has studied the mechanisms of cell proliferation, cell differentiation and stress responses.

Now,she focuses on the studies to apply cyclic phosphatidic acid to the medical use for the regulation of cancer invasion and metastasis, for the improvement of neurogenerative diseases, and for the supression of pain.

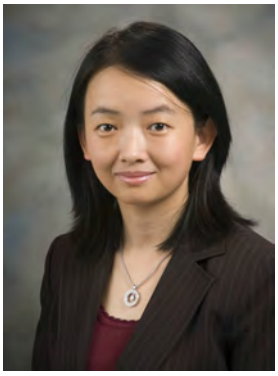
The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Session 1: Evaluation Systems for Gender Equality Activities

ジェンダー平等度評価システム

Session 1 Chair (China)



Mei Tian
Professor, Zhejiang University School of Medicine
Vice President, Zhejiang University Medical Center
Distinguished Professorship of Nuclear Medicine and Molecular Imaging
Vice President, the Zhejiang Association for Science and Technology

Education

Degree: MD. in Clinical Medicine; Shanxi Medical University, Taiyuan, China; 1991-1996
Degree: MSc.: in Medical Imaging; Shanxi Medical University, Taiyuan City, China; 1998-2001
Degree: PhD. In Internal Medicine; Gunma University, Maebashi, Japan; 2001-2004

Research Field

Medical Imaging Diagnosis and Molecular Imaging-based Precision Medicine,
Novel Medical Imaging Agent Development,
Stem Cell or T-Cell Trafficking.

Career History

Career: Prof. Tian has 23 years' post-MD training and practice in radiology, nuclear medicine and molecular imaging, served in academic positions as a clinical fellow at Dana-Farber Cancer Institute / Brigham and Women`s Hospital, Harvard Medical School, an Assistant Professor at MD Anderson Cancer Center, and a Distinguished Professor of nuclear medicine and molecular imaging granted by the Ministry of Education of China. Prof. Tian has spent 12 years for her professional training and working experience in Japan and the USA.

Prof. Tian has received the multiple national and international awards, including the **Women in Science Award.**

Session 1 Speaker (Japan)

Chikako Yoshida-Noro
Professor, Department of Applied Molecular Chemistry, College of Industrial Technology, Nihon University
Division of Cell Regeneration and Transplantation, Nihon University School of Medicine
Chairperson of the 9th Japan-China-Korea Women Leaders Forum Organizing Committee

Education

Degree: BS, Description: in Biology, Chiba Univ., Japan, 1979
Degree: PhD, Description: in Science, Kyoto Univ. Grad. Sch., Japan, 1984

Research Field

Developmental Biology, Cell Biology

Career History

Researcher, Group Leader Furusawa MorphoGene Project, ERATO, JRDC, Tsukuba, 1988—1992; Visiting Scientist, Senior Research Associate Wellcome / CRC Institute, University of Cambridge, UK., 1991—1993; Research Fellow, Precursory Research Embryonic Science and Technology. JRDC, Tsukuba, 1993—1996; Researcher, Brainway Group, Brain Science Institute, RIKEN, Wako, 1998—1999; Research Fellow, Senior Research Scientist, Experimental Animal Division, BioResource Center, RIKEN, Tsukuba, 2000—2005; Associate Professor, Advanced Research Institute for Science and Humanities, Nihon University, Tokyo, 2005—2013; Department of Applied Molecular Chemistry, College of Industrial Technology, Nihon University 2008—; Department of Functional Morphology, Division of Cell Regeneration and Transplantation, Nihon University School of Medicine 2008-; Chairperson of Gender-Equality Committee, College of Industrial Technology, 2010-2017; Professor, 2012-; Member of Gender-Equality Committee, Nihon University 2008-2013, 2019-

Certification

Senior Radiation Protection Supervisor

Awards

Educational Contribution to College of Industrial Technology Award 2009, 2016
Development Growth & Differentiation Paper Award 2013
Albert Nelson Marquis Lifetime Award 2017

Achievements

Achievements include first to identification and characterization of the Cadherin family of cell adhesion molecules; invention of name ‘cadherin’ combining elements from ‘calcium’ and ‘adhere’; invention of shuttle cell culture chamber for in vitro and in vivo stem cell research; Clinical application of dedifferentiated fat cell (mesenchymal stem cell) for regenerative medicine; development of experimental system for the stem cell research in asexual and sexual reproduction of *Enchytraeus japonensis*;

Civic, Political, and Philanthropic Activities

Member of Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE), 2005—; Chair, Sciience Summer School for Girls at Nattional Women's Education Center (NWEC), Japan, 2012; Member of Promoting Communication Committee, NWEC Forum, 2008—; Referee of Grants-in-Aid Science Research., 2008—2011, Member of Gender Equality Committee, JST 2011-2015; Board Member of NPO STEM Career Path Project for Girls (GSTEM-CPP), 2018-

Current Memberships

International Society of Developmental Biologists, International Society for Stem Cell Research, Japanese Society of Developmental Biologists (chair. gender-equality working group 2008—2011), American Chemical Society 2012-, Japanese Society for Regenerative Medicine, Japanese Association of Laboratory Animal Science, Japanese Cancer Association, Molecular Biology Society of Japan, Japanese Biochemical Society, Society Japanese Women Scientists (board member 2008-2013.; chair of 9th annual meeting), Japan Women Engineers Forum.

Assessment of Gender Equality in Academia: Promoting Activity of Female Researchers in Japan and Overseas

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Abstract: Diversity and inclusion are important for the future of science and technology, and sustainable social development. This fact is recognized in many countries, and measures has been taken to promote gender equality in STEM field. The proportion of female researchers in Japan is lower than other developed countries, especially in STEM field. However, as the goverment introduced the national policies, "Gender Equality Basic Plan" and "Science and Technology Basic Plan", and set numerical targets for expanding women's participation in the policy-making process, measures for the female researcher support model projects started in FY2006. These projects has been continued to date, changing the name and system. These measures contributed to the promotion of gender equality in universities and research institutions. These organizations created a better environment for female researchers, and the employment rate of female researchers has increased. The proportion of female researchers increased to 15.3% in 2016, but the number of senior positions are still low, especially in the appointment of executives. Therefore, we would like to make basic data for further development of female researchers activities by organizing the ex-post evaluation results for the past 10 years that are conducted individually for model projects and collecting good examples. We would also like to investigate the gender equality assessment system of academia that has been introduced overseas and propose that it be reflected in future measures in Japan.

Keywords: Gender equality assessment, Female researcher support model project, International comparison of assesment system

1 CURRENT SITUATION IN JAPAN, LAWS AND MEASURES

(1) Female Researchers in Japan

The future of STEM field in Japan and the maintenance and enhancement of the country's international competitiveness depend on the capabilities of people in Japan. It is important to cultivate an environment that makes a diverse pool of individuals including female researchers highly motivated and exercise their capabilities.

The ratio of female researchers in Japan has been gradually increasing, increased from 11.9% in 2006 to 15.3% in 2016. However it is much lower than that of European countries and the US (UK 37.4%, Germany 28.8%, France 26.1%, the United States 34.3%), and especially low in STEM fields. It is important to promote activities by female researchers not only in order to promote gender equality but also to broaden the base of STEM -related competent persons.

(2) Laws and Basic Plans

"The Act on Promotion of Women's Participation and Advancement in the Workplace" was promulgated and enforced in September 2015 (effect on April 1, 2016). This act aims to promote the participation and advancement of women in labor force. Government agencies, local government and private sector corporations with more than 300 employees will be imposed the following on, with the guidelines by the national government. 1) collect and analyze the data on issues of gender and employment; 2) devise and disclose action plans to improve gender equality with concrete objectives and measures based on these analyses; 3) announce the data regarding women's participation and advancement [1].

"The 5th Science and Technology Basic Plan" covers the 5-year period between FY2016-FY2021. Japan's science and technology innovation polices will be promoted based on the 5th Science and Technology Basic Plan. In Chapter 4 Reinforcing the "Fundamentals" for STI, it is described that the numerical targets of the proportion of female researchers among new hires listed in the Fourth Basic Plan (30% of the total in the natural sciences overall, 20% in the physical sciences, 15% in engineering, 30% in agriculture, and 30% in

medicine, dentistry and pharmacology combined) have yet to be achieved, and that in order to quickly achieve these during the period of implementation of the Fifth Basic Plan, Japan is comprehensively promoting all related initiatives through a concerted effort by industry, academia, and the government [2].

On the other hand, in "the Fourth Basic Plan for Gender Equality" (FY2016-2020), one of the performance objectives for 2020 is "Women's participation and advancement in all fields of society". There are particularly few women researchers in engineering and science fields that make up the majority of researchers. The percentage of women out of all researchers is 16.2%, which is lower compared to other countries. The percentage of women in engineering field, which has the largest number of researchers (about 420,000 researchers) is 6.2% (university, etc. 11.1%, companies 5.6%). Making it easier for female researchers to work. It is necessary to be able to continue research activities even when reaching life stages of childbirth and childrearing [3].

(2) Female researcher support model project

Prior to the above, the second Basic Plan for Gender Equality (Approved in December 2005) based on the Gender Equality Society Basic Law (enforced in June 1999) suggest that women should occupy leadership positions by 2020 in all fields of society at least about 30%. In response, the government (Ministry of Education, Culture, Sports, Science and Technology) took measures from 2006 to support the efforts of universities and research institutions that help female researchers balance research and childcare and continue their research activities. Although the contents, purpose, and period of the project have changed, the budget has been continued. Now promoting the active participation of female researchers is emphasized as a part of the development of human resources for science and technology innovation, as "Human Resource Development Program for Science and Technology," which is aimed at reforming systems involved in the fostering of STEM personnel [4].

As a result, the environment for female researchers improved, and recruitment and research activities were promoted. The percentage of female researchers increased from 11.9% in FY2006 to 15.3% in FY2016. In particular, the number of female researchers at universities, etc., accounting for 35.5% of female researchers, increased from 20.4% to 26.3%. The recruitment ratio of female teachers in the natural sciences is increasing, but it varies between fields and is particularly low in engineering. The proportion of female teachers in the universities decline as they become higher ranks. In particular, the proportion of women in the president or vice president of the universities, and professor is still low [4]. How to increase women in leadership positions is still an issue. Companies have introduced numerical targets for executives and are actively improving under the guidance of the Ministry of Economy, Trade and Industry. It is also important to introduce some guidance in academia.

2 SUMMARY OF 10-YEAR EVALUATION OF SUPPORT PROJECTS AND COLLECTION OF GOOD PRACTICES

Interim evaluation and ex-post evaluation are conducted for model projects, and the results are listed on the website. As the project changed, both the issues and the evaluation points changed. Therefore, the projects for which ex-post evaluation was completed (started in 2006-2016) were organized by evaluation items and summarized in a matrix table. From this result, important issues were organized; such as System development, awareness reform, environmental improvement, compatibility support, increase in female researchers, leader development, executive appointment, strengthening of research capabilities, next generation development, collaboration and network construction.

In the initial program, a female researcher support model development project (started in 2006-2010) by the Science and Technology Promotion Coordination Fund, 55 institutions were selected. Emphasis was placed on the development of a system in which female researchers can play an active role, the environment and work-life balance, and the increase in female researchers. Therefore, it was encouraged to conduct research support staff for female researchers during life events. Evaluation points included the next-generation girls' advancement rate to the undergraduate / graduate school of natural sciences and the increase in the advancement rate of doctoral programs for female graduate students. Under the leadership of the president and others, a system reform was required to create a system for increasing female researchers throughout the university.

In the next program, the Female Researcher Training System Reform Acceleration Project (started in 2009-2010), the 12 organizations that had already been adopted as the first project and the environment had been improved were actively working to increase the number of female researchers.

The third program, Female Researcher Research Activity Support Project (21 projects started in 2011-2012), in addition to the above, establishes a support system and consultation system for female researchers, and worked to improve research capabilities such as support for obtaining research funds. Implementation of career path consultation and enlightenment activities for students was introduced to expand the support of female researchers. In the next period, in addition to the conventional type (19 cases adopted in 2013-2014) applied by individual institutions, the project of base type and collaborative type (14 cases started in 2013-2014) were introduced. Since 2015, it has been renamed the Diversity Research Environment Realization Initiative, and two types of projects are running; featured and collaborative. In recent years, the strengthening of research capabilities and the promotion to higher rank have become evaluation points. An analysis was introduced whether or not the research performance of female researchers has improved as a result of such supports. Compared to environmental improvements and system reforms, the number of papers and presentations is easier to quantify, which may be easier to measure as an evaluation. Furthermore, a project to create a nationwide network from 2018, and a project to conduct survey analysis in 2019- were launched.

In the evaluation matrix table analysis, the horizontal axis shows important issues, the vertical axis summarizes the activities of each institution, the items with low evaluation are shown in red, and the good practices that each institution has characteristicly displayed in blue. Good practices include the following; Effective use of the President's discretionary post and a personnel point system for the recruitment of female researchers such as Hokkaido University; Ochadai Index (investigation with evaluation items common to institutions) for institutional survey; Regional cooperation in the Kyushu/Okinawa or Tsukuba area; Leader training programs including mentor system and career development portfolio for female researchers by institutional cooperation.

We would like to summarize these evaluation results, share the good examples with other institutions and discuss how to improve the insufficient points. Furthermore, it is thought that a better system can be achieved by learning not only Japanese methods but also methods from other countries.

3 GENDER EQUALITY ASSESSMENT SYSTEM IN OVERSEAS

In Gender Summit 10 (JST sponsored) held in Japan in May 2017 [5], six working groups (WG) were established and parallel sessions (PS) were held for each theme. One of them, “Presentation of Evaluation Methods for Diversity Promotion” WG (Leader: Ryoichi Fujii, Director of Information and Systems Research Organization) held the PS “Developing Evaluation Methods for Diversity in Research”. The current situation and evaluation methods of gender equality in Germany, China, US., Malaysia and the UK were discussed. Finally, as a recommendation, important requirements for the evaluation system were summarized.

The Sasakawa Peace Foundation (SPF) symposium “Advancing Research Excellence Through Gender Equality” was held in March 2018 [6]. On the first day, talks on “Catalysing Policy and Practice through Assessment: understanding the impact of assessment frameworks and policies on advancing gender equality in research” had been given. On the second day, “Gender equality assessment framework design: A Japan higher education and research sector-wide strategic planning” workshop was held. and discussed on designing a Japanese evaluation framework.

On these occasions, we learned about the gender equality assessment system overseas. To understand it better, the Working Group “International investigation of policies and effects promoting participation of female scientist and engineers” of the Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE) conducted the investigation by the support of SPF. The authors of the description of evaluation systems and outlines are as follows.

1) Athenswan, UK

Yoshiko Nakamura, Research Organization of Information and Systems, Female Researcher Activity Support Office / Coordinator

The Athena SWAN Charter, which has been continuously implemented for over 10 years in the UK, was established in 2005 as a certification system for promoting gender equality in the field of STEM. This report summarizes the evaluation methods of research institutions under this certification system, the transition from the start of the system to the present, and the ripple effects within and outside the UK. In addition, evaluations and issues regarding the system itself were described centered on the official opinion of the evaluation side with the opinions from both the UK and overseas as well as voices from researchers.

2) US ADVANCE

Hisako Otsubo Senior Researcher, Faculty of Pharmaceutical Sciences, Nihon University

ADVANCE is an abbreviation for “Increasing the Participation and Advancement of Women in Academic Science And Engineering Careers”, and The program aimed at increasing the number of women and minority researchers by focusing on organizational changes in universities and research institutions. The flag of the “organizational change” was “recognition and overcoming of ”Unconscious Bias”. The reason why the strategy was switched from supporting individual female researchers to changing the organization and consciousness of university and research institutes was that the effect of the support measures in the first 20 years did not rise as expected. In other words, it became clear that the percentage of female researchers would not increase only by taking care of “pipeline leaks”. The history and achievements are summarized in detail.

3) US SEA Change

Sanae M. M. Iguchi-Ariga, Research Faculty of Agriculture, Hokkaido University

SEA Change, a new evaluation and certification system for promoting organizational, structural change in diversity, equality and conjugation in academic research institutions in the United States. It is headquartered by the American Association for the Advancement of Science (AAAS) that officially started in January 2018 with the support of multiple foundations. Higher education institutions and their departments remove all sorts of systematic, structural discrimination and disability against women, blacks, Latin Americans, Native Americans, disabled people and so on. The goal is to enable talented human resources to participate, continue and succeed in their careers at school and in the institution. The program structure of SEA Change consists of self-evaluation, evaluation criteria, certification and awards, and is largely based on Athena SWAN in the UK.

We are also investigating Spain (EU Horizon2020, Sanae Ariga) and Asia (China, Korea, etc., Noro Chikako Nihon University). We would like to further improve Asian descriptions by exchanging information at this forum.

4 TOWARD THE INTRODUCTION OF GENDER EQUALITY ASSESSMENT TO STRENGTHEN RESEARCH POWER OF JAPAN

In the 13 years since 2006, gender equality in the science and technology field in Japan has progressed in the academic field with planned measures and budgets. But it is still not enough for improving the ratio of female researchers and increasing the number of female leaders in STEM field. We must share information with other countries and find social issues. It is also important to demonstrate the benefits of gender equality for society and the future with specific examples. Our survey data is an excellent tool for that.

In 2019, A research and analysis project was newly introduced in the Diversity Research Environment Realization Initiative, and the proposal of the Research Organization of Information and Systems was adopted. This is a project that conducts surveys and analyzes on examples of outstanding efforts at overseas universities and research institutions, as well as systems in multiple countries where advanced efforts are seen, which contribute to the promotion of female researchers. It is hoped that this research and analysis will further develop gender equality in Japanese academia.

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[3] http://www.gender.go.jp/english_contents/about_danjo/whitepaper/pdf/ewp2019.pdf
[4] https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf
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The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Gender Equality for Sustainable Development Goals

Session 1: Evaluation Systems for Gender Equality Activities

Assessment of Gender Equality in Academia: Promoting Activity of Female Researchers in Japan and Overseas

Chikako YOSHIDA-NORO, Ph.D.

"International investigation of policies and effects promoting participation of female scientist and engineers" Working Group, EPMEWSE

9:00-17:00, Friday, October 11, 2019
Ochanomizu University

2019年10月11日（金）9:00-17:00
お茶の水女子大学　国際交流留学生プラザ

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Gender Equality for Sustainable Development Goals

Session 1: Evaluation Systems for Gender Equality Activities

1. CURRENT SITUATION IN JAPAN, LAWS AND MEASURES

女性の活躍推進に関する動向

"The Act on Promotion of Women's Participation and Advancement in the Workplace"

「女性の職業生活における活躍の推進に関する法律（女性活躍推進法）」（H27.9.4公布・施行）

○国や地方公共団体、民間事業主（大学を含む）は、女性の活躍に関する状況の把握・分析を行い、それを踏まえ、定量的目標や取組内容等を内容とする「事業主行動計画」の策定・公表（H28.4～）等を義務付け。

"The 5th Science and Technology Basic Plan"

「第5期科学技術基本計画」（H28.1閣議決定）
※平成28年度からの５ヶ年計画

○「女性活躍推進法」を活用した各事業主が行う取組の加速
○女性研究者の新規採用割合の増加（自然科学系全体で30%（第4期基本計画の目標値））
○研究等とライフイベントとの両立を図るための支援や環境整備
○女性リーダーの育成・登用に積極的な大学等の取組促進
○ロールモデルや好事例の広範な周知・情報共有
○次代を担う女性の活躍促進に向けた取組推進

"the 4th Basic Plan for Gender Equality"

「第4次男女共同参画基本計画」（H27.12閣議決定）
※平成28年度からの５ヶ年計画

○科学技術・学術分野における女性の採用・登用の促進（女性研究者の新規採用割合に係る第5期科学技術基本計画と同様の目標設定）
○科学技術・学術分野における女性人材の育成等
○研究活動と育児・介護等の両立に対する支援及び環境整備
○研究力の向上に対する支援及び環境整備
○次代を担う理工系女性人材の育成
○理工系分野に関する女子児童・生徒、保護者及び教員の理解促進

the numerical targets in the 4th Basic Plan (30% of the total in the natural sciences in total) 12

https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf

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(1) Female Researchers in Japan

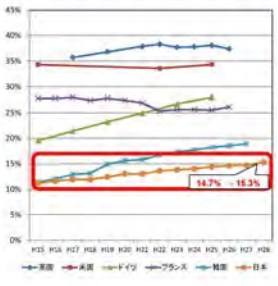
Proportion of Women Researchers and University Professors

Although the proportion of women researchers in Japan is increasing gradually, it is only 16.2% (as of 2018), which is low compared to other developed nations.

女性研究者の割合と国際比較

○我が国における女性研究者の割合は漸増傾向にあるが、諸外国と比較してなお低い水準。

各国における女性研究者割合の推移



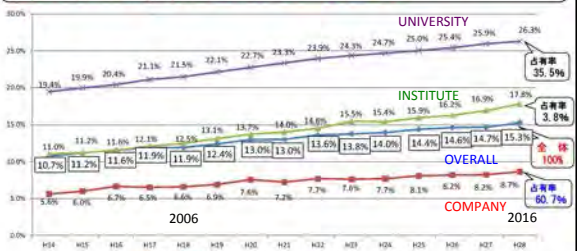
各国における女性研究者の割合

4

https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf

女性研究者の割合推移（機関種別）

○我が国における女性研究者の割合推移を機関種別にみると、企業等・非営利団体における女性研究者の割合は、大学等と比較して、依然として低い状況。



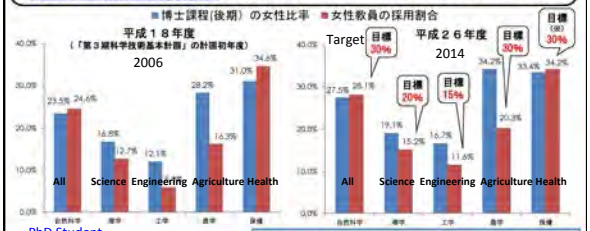
※本調査の「研究者」とは、大学（短期大学を除く。）の課程を修了した者、又はこれと同等以上の専門的知識を有する者で、特定のテーマをもって研究を行っている者。
※大学等の研究者には、教員（助授、准教授、助教及び講師）の他、医局員や大学院博士課程（後期）の在籍者等が含まれる。

資料：総務省「科学技術研究調査」に基づき文部科学省作成

https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf

大学における女性教員の採用割合（自然科学系（全体））

○自然科学系における女性教員の採用割合は増加しているが、工学系において低い状況。
（第５期科学技術基本計画において、第４期科学技術基本計画が掲げた女性研究者の新規採用割合に係る目標値「自然科学系全体としては25%（理学系20%、工学系15%、農学系30%、医・歯・薬学系30%）を早期に達成するとともに、更に30%まで高めることを目指す」を第５期科学技術基本計画期間中に速やかに達成すべきと記載。）



※自然科学は、理学、工学、農学、保健の総数。保健の目標値は、医・歯・薬学系に係るもの。
出典：博士課程（後期）の女性比率は、学校基本調査の結果に基づき、文部科学省作成。
女性教員の採用割合は、教授、准教授、講師、助教に係るもので、文部科学省調べ。

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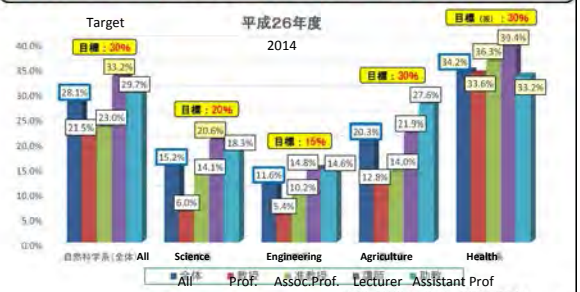
大学における女性教員の採用割合（自然科学系（職位別））

○ 自然科学系における職位別の女性教員の採用割合をみると、講師や助教の割合は目標値を概ね達成しつつあるが、上位職である教授や准教授の割合は低い状況。



出典：女性教員の採用割合は、教授、准教授、講師及び助教に係るもので、文部科学省調べ。
※保健の目標値は、医・歯・薬学系に係るもの。

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大学における職位別の女性教員割合

○ 女性教員の割合は、上位職になるにつれて低下しており、特に、学長・副学長・教授における女性の割合は増加しているものの、依然として低く、指導的立場の女性の活躍が課題となっている。

※教員全体には、助手が含まれる。
資料：学校基本調査の結果に基づき、文部科学省作成

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女性研究者が少ない理由（男女別）

○ 男女共同参画学協会連絡会が平成24年度に実施した、所属する学協会の構成員に対するアンケート項目の中で、女性研究者が少ない理由を尋ねたところ、「家庭と仕事の両立が困難」、「育児期間後の復帰が困難」などが高い割合を占めている。

資料：平成27年版 男女共同参画白書より

https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf

指導的地位の女性比率が低い理由

○ 男女共同参画学協会連絡会が平成24年度に実施した、所属する学協会の構成員を対象にしたアンケートにおいて、指導的地位の女性比率が低い理由を尋ねたところ、「家庭との両立が困難」との回答が男女ともに50%を越えている。その他、「中途離職や休職が多い」、「現在指導的地位にある世代の女性比率が低い」などの理由が高い割合を占めている。

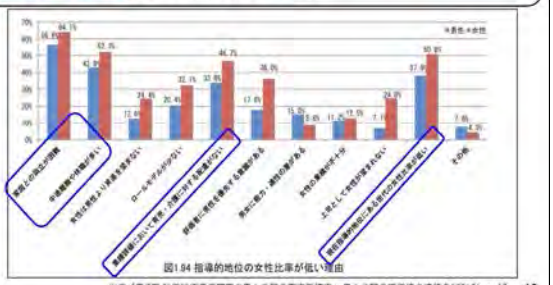


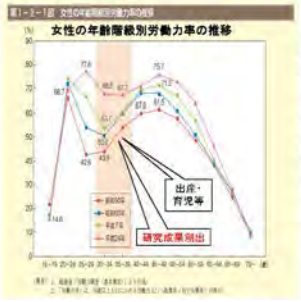
図1.94 指導的地位の女性比率が低い理由

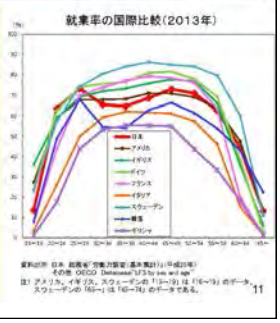
出典：「第2回 科学技術系専門職の男女共同参画実態調査」男女共同参画学協会連絡会(2013) p. 47

https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf

女性の年齢階級別労働力率の推移

○ 研究者にとって、30代後半頃は業績をあげるには重要な時期であるが、我が国における女性の年齢階級別労働力率（就業率）の変化を見ると、底のカーブは緩やかになってきているものの、30代半ばを底とした「M字カーブ」を描いており、先進国に比べると「M字カーブ」の傾向が顕著。





11

The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Gender Equality for Sustainable Development Goals

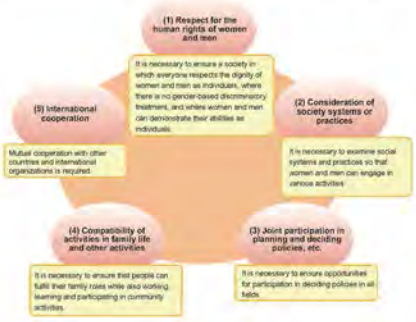
Session 1: Evaluation Systems for Gender Equality Activities

2. SUMMARY OF 10-YEAR EVALUATION OF SUPPORT PROJECTS AND COLLECTION OF GOOD PRACTICES

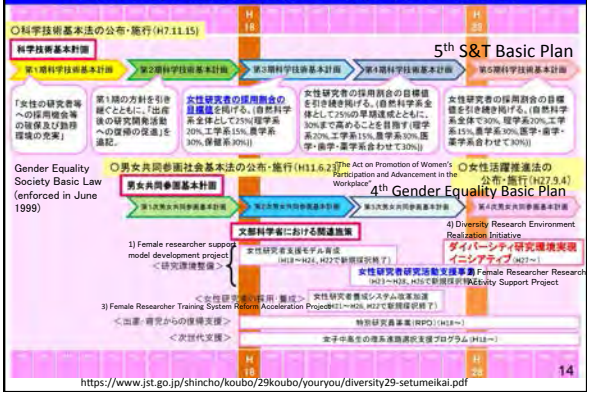
2. The Basic Act for Gender Equal Society (Promulgated and Enacted on 23 June, 1999)

The Basic Act lays out the five pillars (basic principles) relating to the formation of a gender-equal society. It also clarifies the roles of the public administration (the national and local governments) and citizens.

Basic Principles: Five (5) Pillars in regard to the Formation of a Gender Equal Society



文部科学省における関連施策の変遷（基本計画との関係）



https://www.jst.go.jp/shincho/koubo/29koubo/youryou/diversity29-setumeikai.pdf

14

女性研究者の活躍促進に係る施策の変遷

＜女性研究者が活躍できる研究環境の整備＞

○女性研究者支援モデル育成

1) Female researcher support model development project
2006- 2010

○女性研究者研究活動支援事業

3) Female Researcher Research Activity Support Project
2011-2014

＜女性研究者の採用・養成＞

○女性研究者養成システム改革加速

2) Female Researcher Training System Reform Acceleration Project
2009-2010

（行政事業レビューでの指摘等を踏まえた課題と対応）

・機関における組織全体の取組として定着していない ⇒ ・機関としての（中期計画等と関連した）目標・計画の設定・公表、補助終了後の自立的運営の確立

・他機関への普及が不十分 ⇒ ・他機関を牽引する先進的な取組を支援

・柔軟かつニーズに沿った支援が必要 ⇒ ・研究力向上を通じた女性リーダー育成を支援メニューに追加

○ダイバーシティ研究環境実現イニシアティブ（H27年度～）

4) Diversity Research Environment Realization Initiative
2015-

15

https://www.jst.go.jp/shincho/josei_shien/en/index.html

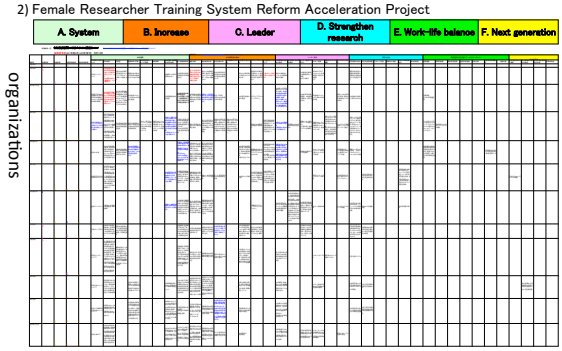
November 4, 2014 — The Ministry of Education, Culture, Sports, Science, and Technology (MEXT) will announce the organizations selected to be part of "Program to supporting research activities of female researchers (Organizations and Collaborations)" funded within the Development of Human Resources in Science and Technology in FY2014.

October 31, 2014 — "The 2014 Symposium will be held, as part of the FY 2014 Program to Support the Research Activities of Female Researchers ? Supporting Female Researchers and Diversity Management" <This event has already taken place>

May 27, 2014 — MEXT will announce a public call for proposals for the "Program to supporting research activities of female researchers (Organizations and Collaborations)" funded within the FY 2014 program to support the development of human resources in science and technology.

Assessment Matrix Table

2) Female Researcher Training System Reform Acceleration Project



Good Practices

- Effective use of the President ‘s discretionary post and a personnel point system for the recruitment of female researchers such as Hokkaido University
- Ochadai Index (investigation with evaluation items common to institutions) for institutional survey
- Regional cooperation in the Kyushu/Okinawa or Tsukuba area
- Leader training programs including mentor system and career development portfolio for female researchers by institutional cooperation.

The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Gender Equality for Sustainable Development Goals

Session 1: Evaluation Systems for Gender Equality Activities

3. GENDER EQUALITY ASSESSMENT SYSTEM IN OVERSEAS

Gender Summit 10 Tokyo 2017

“Presentation of Evaluation Methods for Diversity Promotion” WG
(Leader: Ryoichi Fujii, Director of Information and Systems Research Organization)

2017.5.25-26
一橋講堂　東京

https://gender-summit.com/gs10-about2

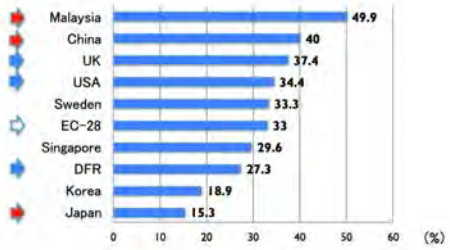
Parallel Session 4
Developing Evaluation Methods for Diversity in Research

Gender Summit 10

<Chair>
Ryoichi Fujii (ROIS, Japan),
Elizabeth Pollitzer (Portia Ltd., U.K.)
<Keynote Speakers>
Sonja Ochenfeld-Repp (GRF , Germany)
Linxiu Zhang, (CAS, China)
Kellina M. Craig-Henderson (NSF, U.S.A.)
Rubiyah Yusof (MJIIT, UTM, Malaysia)
Sarah Dickinson Hyams (Athena SWAN, ECU, U.K.)

<Working Group Members)
Machi Dilworth (OIST, Japan), Iris Wiezelock (IRIS, Japan)
Yoshiko Nakamura (ROIS, Japan), Hisako Ohtsubo (NU, Japan)

Issues Presented as a Background



Issues presented and discussed

Our Milestones

- *Low ratio of women researchers in STEM*
  Strategic area:
  U.S.A: Chem., Math., Computer Sci. (2011)
  China: Green Development
- *Low ratio of women in decision-making positions*
- *Awareness of Unconscious bias (NSF_ADVANCE)*
- *Index for Assessment*
  Athena SWAN, genSET, Ochadai-Index, GEMST
- *Gender dimensions in science*

ADVANCING RESEARCH EXCELLENCE THROUGH GENDER EQUALITY

- CATALYSING POLICY AND PRACTICE THROUGH ASSESSMENT: UNDERSTANDING THE IMPACT OF ASSESSMENT FRAMEWORKS AND POLICIES ON ADVANCING GENDER EQUALITY IN RESEARCH
DATE: MON 26 MARCH 2018, 9:30-17:00

-GENDER EQUALITY ASSESSMENT FRAMEWORK DESIGN: A JAPAN HIGHER EDUCATION AND RESEARCH SECTOR-WIDE STRATEGIC PLANNING WORKSHOP
DATE: TUE 27 MARCH 2018, 9:30-17:00

PLACE: THE SASAKAWA PEACE FOUNDATION
1-15-16 TORANOMON,TOKYO, 105-8524

LANGUAGE: SIMULTANEOUS JAPANESE AND ENGLISH

Gender Equality Assessment System Overseas

1) Athenswan, UK

Yoshiko Nakamura, Research Organization of Information and Systems, Female Researcher Activity Support Office / Coordinator

2) US ADVANCE

Hisako Otsubo Senior Researcher, Faculty of Pharmaceutical Sciences, Nihon Univ.

3) US SEA Change

Sanae M. M. Iguchi-Ariga, Prof. Research Faculty of Agriculture, Hokkaido Univ.

4) EU Horizon2020 , Spain

Sanae M. M. Iguchi-Ariga, Prof. Research Faculty of Agriculture, Hokkaido Univ.

5) Asia (China, Korea, etc.)

Chikako Yoshida-Noro, Prof. College of Industrial Technology, Nihon Univ.

The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Gender Equality for Sustainable Development Goals

Session 1: Evaluation Systems for Gender Equality Activities

4. TOWARD THE INTRODUCTION OF GENDER EQUALITY ASSESSMENT TO STRENGTHEN RESEARCH POWER OF JAPAN

Summary

- In the 13 years since 2006, gender equality in the science and technology field in Japan has progressed in the academic field with planned measures and budgets.
- still not enough for improving the ratio of female researchers and increasing the number of female leaders in STEM field.
- share information with other countries and find social issues.
- demonstrate the benefits of gender equality for society and the future with specific examples.
- New project that conducts surveys and analyzes on examples of outstanding efforts at overseas universities and research institutions by ROIS

Session 1 Speaker (Japan)

Yasuko SASAKI
Trustee and Vice President, Ochanomizu University

Education

- MA (Japanese Literature), Graduate School of Humanities and Sciences, Ochanomizu University, Japan 1978
- MA (Humanities and Sciences), Graduate School of Humanities and Sciences, Ochanomizu University, Japan 1991

Research Field

- Sociolinguistics

Career History

- Assistant, Graduate School of Humanities and Sciences, Ochanomizu University 1993-1995:
- Assistant Professor, Faculty of Letters and Education, Ochanomizu 1997-2000:
- Associate Professor, Faculty of Letters and Education, Ochanomizu 2000-2001:
- Associate Professor, Foreign Student Center, Ochanomizu University 2001-2005:
- Director of Foreign Student Center, Ochanomizu University 2004-2005:
- Associate Professor, International Education Center, Ochanomizu University 2005-2007:
- Director of International Education Center, Ochanomizu University 2005-2010:
- Professor, Graduate School of Humanities and Sciences, Ochanomizu University 2007-2019:
- Councilor of International Affairs, Ochanomizu University 2007-2010:
- Principal of Primary School attached to Ochanomizu University 2011-2015:
- Visiting Professor, Strasbourg University 2015:
- Councilor of International Affairs, Ochanomizu University 2015-2016:
- Vice President of International Affairs, Ochanomizu University 2016-2019:
- Trustee of Gender Equality and Vice President of International Affairs, Ochanomizu University 2019-

Achievements

- As a vice president of international affairs at Ochanomizu University, I have promoted the internationalization of Ochanomizu University and established its oversee's partner universities.
- As a trustee of gender equality, I have promoted gender equality of Ochanomizu University, expanded the global network of research collaboration on Female Leaders and leadership and held international symposiums and forums.

What Promotes Gender Equality on Campus?

Yasuko **SASAKI** [1]

([1.] Ochanomizu University, 2-1-1 Otsuka, Bunkyo-ku, Tokyo, 112-8610, JAPAN.

E-mail: sasaki.yasuko@ocha.ac.jp)

Abstract: The 'Ochadai Index' was created based on the results of the Support Program for Women Researchers (FY2006-2008) financed by the Special Coordination Fund for Promoting Science and Technology from MEXT. It is a self-evaluation index of the educational as well as research institutions' employment environments. By examining the evaluation results with *COSMOS WorkBook*, we can improve the employment environment for women. Moreover, we will continuously try to ameliorate the index based on our research results.

Keywords: Ochadai Index, Self-evaluation, COSMOS WorkBook

1. Introducing the Ochadai Index

The 'Ochadai Index' was created based on the results of the Support Program for Women Researchers (FY2006-2008) financed by the Special Coordination Fund for Promoting Science and Technology from MEXT. It is a self-evaluation index of the educational as well as research institutions' employment environments. It is divided into four main categories, and further into subcategories. Each participating institution applied the index to assess their present situation, based on a 3-point grading system. By examining the evaluation results with *COSMOS WorkBook*, we can work on the improvement of the employment environment for women.

THE OCHADAI INDEX		
MAIN CATEGORIES	SUBCATEGORIES	ITEMS TO GRADE (0, 1, OR 2)
School-wide support system	Organization	Established an organization to support women researchers; 8 more items
	Work system	Made efforts to increase work efficiency; 5 more items
Support for women researchers	Child-rearing support	Created a women's lounge; 5 more items
	Research and education support	Created flexible work systems during child-rearing; 10 more items
Information support	Building an information bank	Disseminated information via websites; 5 more items
Raising awareness	Next-generation development	Held sample lectures on and off campus for middle school and high-school girls; 3 more items
	Raising awareness	Informed all staff about support for women researchers; 7 more items

2. Referring to the AKKA Program of Lund University and Humbert, Kelan, and Clayton-Hathway (2019)

We are living in an ever-changing world where the continuous updating of measurements is imperative. The following approaches are worth referring to:

2.1 The AKKA Program of Lund University, Sweden

The AKKA program at Lund University contributed to the significant progress of gender equality, thereby raising the understanding of gender and gender awareness. It held workshops and seminars on those two areas and lasted more than ten years from 2004 to 2014.

2.2 Humbert et al. (2019)

According to Humbert et al. (2019), they conclude that for further and faster progress of gender balance to be made, the introduction of legislated board quotas shows excellent potential, but only in combination with a striving for a gender-equal society and using hard sanctions.

3. Discussion/Conclusion

As for the Ochadai Index, since 2010, we have conducted a survey of educational and research organizations, including Ochanomizu University using the Ochadai Index. We have analyzed the results and shown it on our homepage every year since 2010. So, what was the result of the evaluation of Ochanomizu University among the participating 41 universities? Ochanomizu University was 6th among the 41 national and private universities in 2017. Unfortunately, we were not the first. However, regarding the proportion of female to male faculty members among other national universities, Ochanomizu is in the first place. That is, Ochanomizu University is the most advanced university in gender equality of national universities. Since Ochanomizu University implemented a variety of measures, such as seminars, workshops, research, and other events, we believe these contributed to raising gender understanding and awareness, as well as implementing various measures to develop a gender-equal environment.

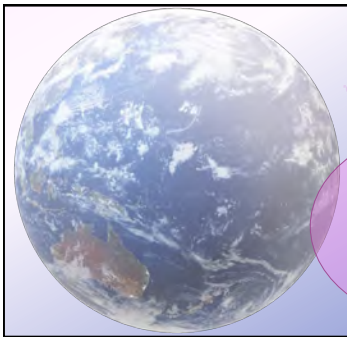
Though the result of the assessment by the Ochadai Index of Ochanomizu University, the AKKA program and Humbert et al. (2019), we learned that not only one measure can develop institutions' gender equality but an amalgamation with other measures such as the development of the working environment through raising awareness of gender understanding and legislated board quotas.

REFERENCES

[1] Humbert, A., Kelan, E., & Clayton-Hathway, K. (2019). A rights-based approach to board quotas and how hard sanctions work for gender equality. *European Journal of Women's Studies*, 1-22.

[2] Lund University (n.d.). *AKKA Leadership Program*. Retrieved from https://eige.europa.eu/gender-mainstreaming/good-practices/sweden/akka-leadership-programme

[3] Ochanomizu University Center for Leadership Education and Research COSMOS (2012, July 31). *COSMOS WorkBook*. Tokyo: Ochanomizu University.



The 9th Japan-Korea-China Women Leaders Forum for Science & Technology
October 11, 2019, Ochanomizu University
"Gender Equality for Sustainable Development Goals"

What Promotes Gender Equality On Campus

Yasuko SASAKI

CONTENTS

1. The Ochadai Index

An Overview

THE OCHADAI INDEX		
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School-wide support system	Organization	Established an organization to support women researchers; 8 more items
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Raising awareness	Next-generation development	Held sample lectures on and off campus for middle school and high-school girls; 3 more items
	Raising awareness	Informed all staff about support for women researchers; 7 more items

We now plan to improve the Ochadai Index based on the previous survey.

A specific question is how to design the recognizing system of our competency to promote gender equality on campus.

2. Notable Attempts to Promote Gender Equality on Campus

1) Athena SWAN at University College London

An Interview with Professor Sara Mole

- UCL found that there was a gender bias as students' and staff's positions increased.
- In order to clarify the cause and improve this situation, UCL decided to use the Athena SWAN.
- UCL has 17 departments, and their goal is for all departments to apply to Athena SWAN and get Silver.
- UCL organizes the Gender Equality Team, and people of various ages and positions within the university participated in the team of their own will.

☞ The reasons for their success:

- The top of the university has taken the strong initiative and then tackled the whole university.
- The result of the evaluation of Athena SWAN is linked to a subsidy from the government.

2. Notable Attempts to Promote Gender Equality on Campus

2) The AKKA Program of Lund University

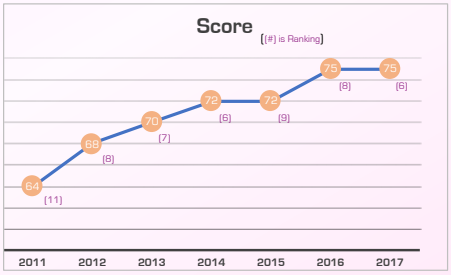
An Interview with Professor Lövkrona

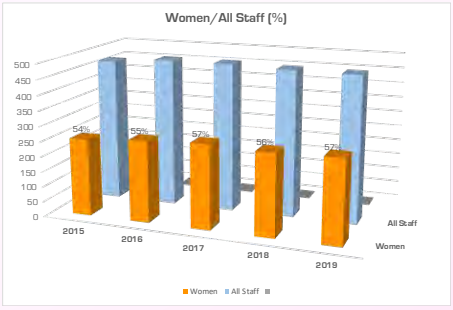
- The proportion of women rapidly decreases as they advance to the careers of lecturers, associate professors, and professors.
- In order to clarify the cause and improve this situation, Lund University implemented the AKKA Program.
- When the program spread, men were actively invited to participate to train male leaders who understand gender and gender awareness in order for women to be active.
- The program provided opportunities for learning about leadership by holding seminars, workshops, and project work.
- As a result, in 2005, when the program started, there was only one woman out of eight deans, but in 2014 their number was 50:50.

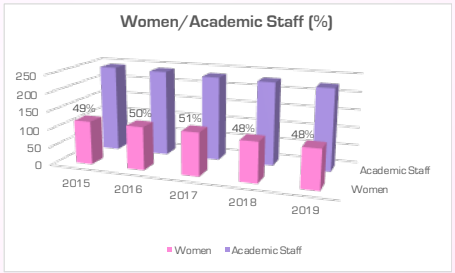
☞ The program sees leadership as something that can be learned rather than inherited.

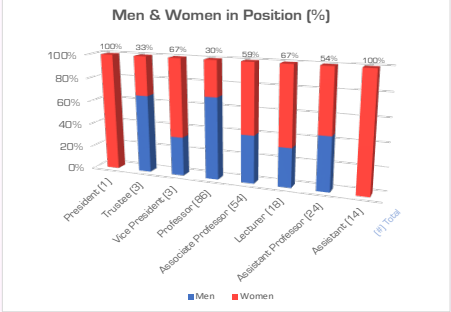
3. A New Orientation of Gender Equality on Campus

Discussion/Conclusion









Through the result of the assessment by the Ochadai Index of Ochanomizu University, the Athena SWAN at UCL and the AKKA program at Lund University, we learned that not only one measure can develop institutions' gender equality but an amalgamation with other measures such as the development of the working environment through raising awareness of gender understanding and legislated board quotas.

Session 1 Speaker (Korea)

So Young KIM
Chair, Long-Term Policy Committee, KOFWST
Head, Graduate School of Science & Technology Policy, KAIST

Education

Degree: B.A. English Education, Seoul National University, Seoul, Korea, 1993
Degree: M.A. Political Science, Seoul National University, Seoul, Korea, 1996
Degree: M.S. Mathematical Methods in Social Sciences, Northwestern University, Evanston, U.S., 1999
Degree: Ph.D. Political Science, Northwestern University, Evanston, U.S., 2004

Research Field

Science and Technology Policy (R&D Policy, S&T Workforce Policy, Women in Science Policy)
International Political Economy, Quantitative Methodology

Career History

2014-present, Kenya KAIST Project Coordinator (Deputy Director for the Center for Establishment of Kenya Advanced Institute of Science and Technology), KAIST
2012, Visiting Professor, Georgia Institute of Technology, Atlanta, U.S.
2004-2006, Assistant Professor, Florida Atlantic University, Boca Raton, U.S.
2004, Data Archivist, Social Science Computing Center, University of Chicago, Chicago, U.S.

Appointments

2019-present, Co-Chair, Science Diplomacy Committee, Korea Federation of Science and Technology Associations (KOFST)
2018, National R&D Review Committee, Ministry of Science and ICT
2018, Vice President, Korea Technology Innovation Society
2018, Board Member, Korea Society for Innovation Management and Economics (KOSIME)
2017-present, Deputy Director for the Fourth Industrial Revolution Intelligence Center, KAIST
2017-present, Member of University Gender Equality Committee, Ministry of Gender Equality

2017-present, External Advisory Member, Institute for Public Understanding of Risk, National University of Singapore

2016-present, Editorial Member, *East Asian Science, Technology, and Society* (SSCI)

2016-present, Member of Global Future Council of World Economic Forum

2016-present, Co-Chair, Fourth Industrial Revolution Net, KOFST

2014-present, Project Coordinator for the Establishment of Kenya KAIST Project

Awards

2018, KAIST International Collaboration Award

2010, KAIST Facutly Service Award

Current Memberships

American Political Science Association, International Political Science Association, Korean Political Science Association, Korean Technology Innovation Society

Evaluating Progress in Gender Equality in S&T in South Korea

So Young KIM[1]
(1. Graduate School of Science & Technology Policy, KAIST, 291 Daehak-ro, Daejeon, 34141, KOREA, soyoungkim@kaist.ac.kr)

Abstract: Despite various programs and policies to promote women in S&T in the last two decades in South Korea, there still exists much room for improvement in the effort of both the government and the community of women scientists and engineers to attract and advance more women in S&T. This paper reviews the achievements and limitations of the implementation outcomes of the three governmental five-year plans in South Korea to foster and support women in S&T. Major focus is on a reflective evaluation of key results and structural limits rather than a simple summary of what went well and what went wrong. The paper then makes three recommendations for the future effort including the fourth plan that just began, especially to compensate for uneven progress across different areas and career levels of women in S&T.
Keywords: women in science and technology, gender equality, S&T workforce, South Korea

1. Introduction

Much effort has been made since the 1990s in South Korea to promote women in S&T, with the most outstanding example being the series of systematic government-wide five-year plans now entering the fourth phase. As revealed in the review of the most recent Third Five-Year Plan for Fostering Women in S&T, the rate of female students graduating from S&T degrees increased from 23.9% in 2006 to 29.4% in 2017. Also, the share of women scientists or engineers hired in full-time permanent positions arose from 14.9% to 22.2% for the same period.

There still exists much room for improvement, however. In particular, women remain significantly under-represented in many fields of engineering. While the rate of female students admitted to departments or programs of natural sciences now reaches 52.7% on average, only one in four students is female in engineering departments with some engineering departments showing even much lower ratios (e.g., 8.3% for mechanical engineering, 9.1% for electrical engineering).

This paper provides a reflective evaluation of South Korean effort to recruit, retain, and advance women into S&T based on the reviews of the aforementioned five-year plans with a focus on unbalanced progress across different areas and career levels.

2. Remarkable but Uneven Progress

With the Framework Act for Fostering and Supporting Women in S&T enacted in 2002, the South Korean government promptly embarked on the implementation of the Act in the form of five-year plan of strategies and tasks. Though this was a government plan, the actual implementation largely depended on women scientists and engineers who participated – more or less voluntarily – in various public or quasi-public programs and organizations that sprang up to support women in S&T. Therefore, the outcomes of the five-year plans can be

considered not simply as the result of government policy implementation but as the collective effort of the South Korean community of women in S&T. This implies that an evaluation of whatever progress or setback made during the last 15 years in the promotion of women in S&T in South Korea should not be an aloof criticism of government policy but a sincere reflection of why some areas witness visible progress and others remain resistant to change.

2.1 First Plan (2004~08): Laying the Ground

Looking back after fifteen years, the first five-year plan was relatively straightforward in the sense that most tasks addressed the recruitment of women into S&T, namely fixing numbers [1]. One of the most outstanding goals of this plan was to attract more women into S&T, especially school-age girls. The so-called 4W programs (WISE, WIST, WIE, WATCH21) activated during the years of the first plan generally targeted female students enrolled in secondary and tertiary schools. The WISE Program ran activities mostly for middle-school and high-school students, while WIST and WIE focused on post-secondary students enrolled in undergraduate and graduate programs. The WATCH21 Program supported team activities connecting secondary and tertiary students.

Such effort to attract more girls into S&T had very visible outcomes including the increase of the WISE Program beneficiaries (from 22,349 in 2004 to 36,992 in 2007) and of the WATCH21 teams from 40 to 60 in the same period. Notably, the percentage of female students in S&T doctoral recipients rose from 16.0% in 2000 to 19.5% in 2007. The percentage of female students in S&T master's degree awardees also increased from 17.2% in 2000 to 24.5% for the same period. The first plan is therefore assessed to have laid the ground for the recruitment and promotion of women in S&T, given such a noticeable significant increase in the number of female students studying S&T fields or subjects in secondary and tertiary schools.

Yet there were still notable areas for further improvement. Despite the inflow of female students into S&T, the top-rank female students were still attracted to medical fields (including dentistry and oriental medicine) with the increasing preferences for stable jobs due to worsening economic insecurity. In particular, engineering fields kept suffering from low rates of female students.

2.2 Second Plan (2009~12): Aiming at More Ambitious Goals

The second five-year plan set out a very clear goal in the areas of recruitment by aiming to increase the share of female students in engineering up to 25% and to produce annually 1,000 female doctoral recipients in S&T [2]. The plan also suggested a similar quantitative target in the utilization of the women S&T workforce by proposing to secure 10% of S&T jobs for women scientists and engineers and to raise the percentage of women project investigators (PIs) of national R&D projects to 10%.

Some of such ambitious goals saw only partial success. The rate of female students admitted to engineering programs reached 20.4% in 2012, which fell far below the proclaimed goal. In fact, the share of high-school girls in S&T remained virtually unchanged during the period of the second plan (34.7% in 2007 to 35.3% in 2011). Yet, other goals were

successfully achieved, which include the share of women PIs increasing to 11.6% in 2012 (from just 9.1% in 2008) and the number of female S&T doctoral recipients reaching 1,127 in 2012 (from 705 in 2007).

Though the second plan saw mixed success in the recruitment goals of women in S&T, one of the new attempts that left indelible legacy was to reform existing institutional practices concerning the hiring and promotion of women scientists and engineers. Due to various policies to promote women in S&T workplaces such as the employment quota, retraining of women in S&T, and support for women of career-breaks, the share of women in new employees of S&T organizations rose from 22.4% in 2007 to 24.6% in 2012, with the portion of women in regular/permanent positions also rising from 9.8% to 12% in the same period.

2.3 Third Plan (2014~18): Refinement and Sophistication

Beginning in just ten years since the first plan was implemented, the third plan had abundant data and records to evaluate before setting out goals and activities. The review of the second plan at the time of formulating the third plan pointed out three limitations of the previous effort to attract and advance women in S&T [3]. One was the uneven recruitment pattern of female students across S&T fields. For example, female students were not only under-recruited in engineering in general but significantly under-represented in those fields of engineering of great economic potentials such as electrical engineering and computer science. Secondly, the persistently low quality of employment in addition to the shortage of jobs remained to be a big hurdle for the retention and advancement of women in S&T, with disproportionately large number of women scientists and engineers hired in temporary positions. Finally, due to the persistent culture of over-work and male-dominant work practices, women successfully launching their S&T careers in universities, research institutes or companies were forced out to stay home.

While the third plan still kept some quantitative targets, it placed more focus on the refinement of policy targets and goals to affect the organizational behavior and culture of schools and work places. One of the most outstanding programs pursued in the third plan was the Program for Career Returns of Women in S&T that provided monetary support for the training and hiring of women returning to R&D work after career breaks. A policy evaluation study of this program reveals that the program made a significant in-road into public and private research institutes absorbing such women as full-time permanent researchers, though universities did not show similar performance in terms of hiring career-break women in R&D positions [4].

3. Recommendations for Long-term Success

Now with the fourth plan just starting [5], it is time to build longer-term sustainability of the policy to recruit and retain women in S&T from candid evaluations of the success and limitations of the past effort at the fostering of women in S&T. Based on the review of the past implementation of three plans presented above, at least three recommendations can be made. Firstly, given the limited budget and personnel, more effort must be geared towards

strategic distribution of the available resources across different areas of S&T and different career levels. Secondly, although the third plan took a very serious note of the retention program, much more effort must be leveled at the later parts of the leaky pipeline, which implies a shift of policy focus from the recruitment to the retention and advancement stages in those fields that already achieved quantitative targets. Finally, as is recently emphasized in the vast literature and effort for gendered innovation, more effort must be made to fix not only numbers or institutions but knowledge, the very content of S&T research. In that regard, it is quite encouraging to see the fourth plan expanding several goals for gendered innovation that was first introduced into a policy document in the third plan.

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[3] Ministry of Science, ICT and Future Planning. 2014. The Third Five-Year Plan for the Fostering and Promotion of Women in Science and Technology.

[4] Korea Advanced Institute for Women in Science, Engineering and Technology (WISET). 2016. Evidence-based Appraisal of the Program for Women Returners to Research and Development.

[5] Ministry of Science and ICT. 2019. The Fourth Five-Year Plan for the Fostering and Promotion of Women in Science and Technology.

2019 Japan-Korea-China Women Leaders Forum for S&T

Evaluating Progress in Gender Equality in S&T in Korea

So Young Kim
Head of the Graduate School of Science, Technology, and Policy, KAIST
Chair of the Long-term Policy Committee, KOFWST
October 11, 2019

Five Years Ago…

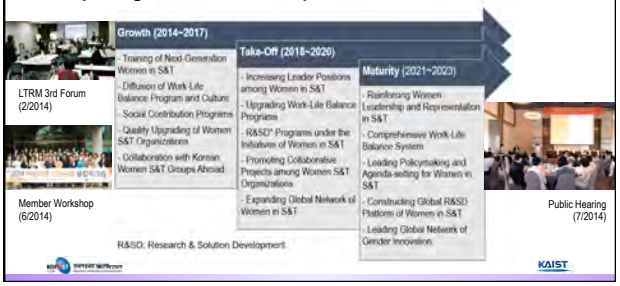
- KOFWST developing the Long-term Policy Roadmap for Women Scientists and Engineers, which was the first bottom-up effort of Korean women in S&T to canvass the current landscape of policy for women in S&T and to identify key issues to be addressed in the long run.

(Women in S&T) Urgent Need to Minimize Career Breaks of Women in S&T in the Age of Jobless Growth

(Women for S&T) Increasing Demand for Active Roles of Women for Welfare, Safety, Environment, Quality of Life, etc. beyond Industrial Growth

Long-Term Policy Roadmap for Women Scientists & Engineers

Proposing to Proceed in Steps



Recommending Further Effort

- To implement policy tasks identified as important and urgent
- To continuously update on major issues of women in S&T
- To create a sustainable system of policy and institutions integrating the two aspects of women S&T (women in S&T and women for S&T)

Still Fixing Numbers and Institutions

- Still leaky pipeline

★Small # of female students choosing engineering
★Difficult to survive graduate schools

★Many female graduates hired in temporary jobs
★Career breaks due to childbirth/ childbearing

★Slow promotion to higher leadership positions
★Limited R&D opportunities for women researchers

Areas of the Slowest Progress

Education

- Unbalanced shares of female students across S&T fields
- Difficult lab conditions for female grad students

Career Entry

- Female graduates accounting for only 1/4~1/3 of new hiring in R&D workforce
- Female graduates tending to be hired in temporary positions

Career Advancement

- Very small share of women researchers among large-scale R&D PIs
- Under-representation of women in S&T leadership

Education

- KOFWST running the first survey of the comparison of educational environments of female vs. male graduate students this year

○Pilot survey of major universities (representative of different types of universities – public vs. private, general vs. S&T-focused, Seoul vs. other regions)

○Responses: 645 (male: 61.4%, female: 38.6%)

Grad Survey Result

- Female doctoral students spending roughly the same amount of time in labs but being paid less

(Hours)		Male	Female	All	t	F
Degree Program	Master's	20.54	18.08	**19.41**	0.971	7.894***
	Integrated	26.54	24.26	**25.80**	0.798	
	PhD	19.62	19.00	**19.38**	0.199	

vs

(KRW 1,000)		Male	Female	All	t	F
Degree Program	Master's	838	834	**830**	0.072	58.260***
	Integrated	1,269	1,100	**1,210**	2.509*	
	PhD	1,411	1,280	**1,360**	1.388	

Grad Survey Result

- Female grad students less satisfied with their advisors but experiencing more discrimination

Satisfaction with Advisors

(7-point Likert Scale)		Male	Female	All	t	F
Degree Program	Master's	5.54	5.05	**5.31**	2.545*	4.593*
	Integrated	5.03	4.55	**4.87**	2.161*	
	PhD	5.16	4.93	**5.07**	0.799	

Experience of Discrimination

(7-point Likert Scale)		Male	Female	All	t	F
Degree Program	Master's	1.48	2.07	**1.75**	-3.852***	0.893
	Integrated	1.65	2.28	**1.86**	-3.683***	
	PhD	1.61	1.84	**1.70**	-1.186	

Grad Survey Result

- Female grad students having more difficulty in work-life balance & personal relationships and worrying more about careers/jobs

Difficult Problems to Handle in Graduate Life	%		All
	Male	Female	
Work-Life Balance	21.0	26.5	23.1
Careers & Jobs	23.7	26.5	25.0
Personal Relationships	4.8	6.8	5.6
Research Performance	28.5	26.1	27.6
Military Service	4.3	0	2.6
Other (Marriage, Dating, etc.)	8.3	8.0	8.2
None	9.3	5.6	7.0

Career Entry

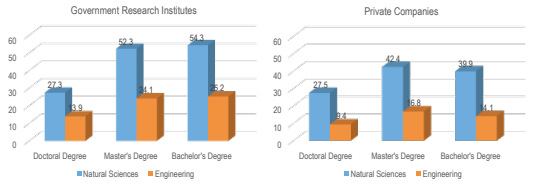
- Share of women in new R&D hiring (share of women in temporary positions in parenthesis)

Universities	Public Research Institutes	Private Companies
27.2% (29.5%)	36.7% (39.9%)	23.3% (65.4%)

2017 Report on the Status of Women in SET (WISET 2018)

Permanent Positions (New Hiring)

- Share of women in R&D hired in permanent positions by degree



Temporary Positions (Existing Jobs)

- Share of temporary positions 2.5 times larger among female S&T workers than in male S&T workers

Men vs. Women	Unit	2010	2013	2016
Men	In 1,000	45	53	60
	%	4.7	4.5	5.0
Women	In 1,000	67	79	78
	%	**13.6**	**13.6**	**12.2**

KOFWST Issue Brief #1 on Temporary Female S&T Workers (2018)

Career Advancement

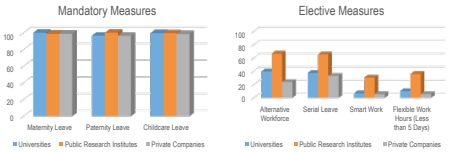
- Women holders of leadership positions in universities

Unfair Payment?

- Women new hires getting smaller payment
  - 24.8% of those new hires getting less than 30 million KRW are women (vs. 14.8% of men)
  - 85.3% of those new hires getting more than 30 million KRW are men (vs. 75.2% of women)

Inconvenient Truth: WLB Only on Paper

- Significant imbalance between mandatory and elective measures of WLB



More but Smaller Projects?

- More women PIs

Inconvenient Truth: More but Smaller?

- But doing smaller projects

Project Size (in KRW)	Share of Women PI
1 billion or more	8.8%
100 million ~ less than 1 billion	7.5%
30 million ~ less than 100 million	12.3%
Less than 30 million	10.2%

2017 Report on the Status of Women in SET (WISET 2018)

In Lieu of Conclusion

Fixing numbers (e.g., hiring quotas, gender ratio of committees)

Fixing institutions (e.g. paternal leave, childcare center at work, WLB)

Fixing knowledge (e.g., bias in modern depictions of fertilization)

- Still more work to do to fix numbers and institutions
- Big pictures important but need more refined approach looking into details (e.g. survey of young researchers)
- Need to identify areas of slow progress and address the root causes to develop right kinds of policy to incentivize relevant stakeholders (e.g., moving from supplementary/ temporary payment for career-break women of S&T to re-structuring of work and culture for them to sustain their careers)

Thank you.

- soyoungkim@kaist.ac.kr

Session 2 Speaker (China)

Ruomei LI

Dr., Adviser, Former Secretary-General, Chinese Society for Electrical Engineering

Education

Degree: B.E., School: Hefei University of Technology, Location: Anhui, China, Year: 1982
Degree: M.E, School: China Electric Power Research Institute (CEPRI), Location: Beijing, China, Year:
Degree: PhD, School: University of Bath, UK, Location: UK, Year: 2000

Research Field

Electrical engineer career for system analysis and operation control

Career History

She started her electrical engineer career for system analysis and operation control in the Anhui electric power dispatch Center during 1982-1986. In China electric power research institute (1989-1994, 2000-2004), she was engaged in the research and management work, for power system digital simulation and analysis, operation control strategy, planning and power electronic technology. In recent years, her focus is in promotion of clean energy in China. Her interested areas also include energy revolution and humanity. She served as Deputy Secretary General/Secretary General of Chinese electrical engineering society (CSEE) during 2004~2013. She was member of CIGRE Administrative Council/Steering Committee (2005/2006-2014). She was the AORC-CIGRE chair (2010-2012) and CIRED steering committee member (2007-2017). She is the initiator and organizer of female engineers' activities in China's power & energy field, from 2012. She is the first chair of CIGRE WIE Task force and the main organizer of WIE event in CIGRE Paris Sessions since 2014. She initiated the IEEE PES WIP activity in China in 2018.

Awards and Scholars

The second prize of the Science and Technology Progress award by China Ministry of Energy in 1991 (No.4)

The first prize of the China National Science and Technology Progress Award in 2008 (No.4)

Honorary member of CIGRE 2014

The “2019 IEEE PES Wanda Reder Pioneer in Power Award”

Current Memberships

Senior member of IEEE

Chair of Women in Power Committee (WIP) of IEEE Power & Energy Society (PES)

Executive Council member of World Federation of Engineering Organizations (WFEO)

Council member of China Women's Association for Science and Technology (CWAST)

Invited Research fellow of Energy Internet Research Institute of Tsinghua University since 2015

Up to now, she is a member of the Editorial Advisory Board of Tellus B-Chemical and Physical Meteorology, Atmospheric Environment, the Editorial Board of Acta Chimica Sinica, Acta Scientiae Circumstantiae (Chinese). She is also the member of several scientific program, including China SOLAS (the Surface Ocean – Lower Atmosphere Study), China IGAC(International Global Atmospheric Chemistry) China iLEAPS (Integrated Land Ecosystem- Atmosphere Processes Study) , and China ABC (the Atmospheric Brown Cloud).

INVESTIGATION AND ANALYSIS OF THE STATUS OF CHINESE WOMEN IN SCIENCE AND TECHNOLOGY

RUOMEI LI
Chinese Society for Electrical Engineering, China
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Abstract: In order to realize UN SDG 5, to achieve gender equality and empower all women and girls, it is necessary to understand the current status, problems, expectations and needs of women. This report has shown the survey data of China's women workers of science and technology, the analysis of the professional women's growth path, the career bottleneck and challenges facing. It points out that a new generation of science & technology and social development trend of diversity, would give women more growth opportunities. However, despite equal educational opportunities, the existing employment and retirement policies for women, as well as the lack of self-confidence caused by the social and cultural environment, still hinder women's career development. This paper points out that the policy makers should adjust policies in consideration of women's special responsibilities in family and next generation cultivation, to provide equal development opportunities for males & females. On the other hand, special education/training and social activities can also play the key functions. Women have a great potential capability which can produce a greater impact on the sustainable development.
Keywords: investigation of women's status, demand and bottlenecks in career, policy needs, role of social activities, opportunities and prospects.

EMPOWER WOMEN, MAKING WOMEN IN POWER

Dr. Ruomei LI, 11/Oct/2019, Tokyo, Japan

Council Member, China Women Association of Science and Technology
Chair, IEEE PES WIP,
Executive Council Member, World Federation of Engineering Organizations

Dr. Ruomei LI

IEEE Senior member, CIGRE Honorary Member.
WIP Chair, IEEE PES
Executive Council, World Federation of Engineering Organizations (WFEO)
Invited Research Fellow,
Energy Internet Research Institute, Tsinghua University
Council, Chinese Women Association for Science and Technology (CWAST)
Consultant, Chinese Society for Electrical Engineering (CSEE)

Main Titles & Awards

- Chair/Co-Chair, CIGRE Women Engineering Working Group (2013-2018)
- Secretary General, Chinese Society for Electrical Engineering (2009-2013)
- CIRED Directing Committee (2007~2017)
- CIGRE Administrative Council/Steering Committee (2005/2006~2014)
- Chair, CIGRE AORC (2010~2012)
- *IEEE PES Wanda Reder Pioneer in Power Award, 2019.*
- *CIGRE Honorary Member, 2014*

OUTLINE

- SDG 5-goal for Women
- What is the Status of Women?
- Women in Power, Why & How?
- The Specialility of Women, Advantages & Challenges
- To Empower Women

5 GENDER EQUALITY

SDG 5- Goal for Women

Goal 5: Achieve gender equality and empower all women and girls

- Recognize and value unpaid care and domestic work through the ***provision of public services, infrastructure and social protection policies and the promotion of shared responsibility*** within the household and the family as nationally appropriate.
- Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic and public life.

SDG 5- Goal for Women

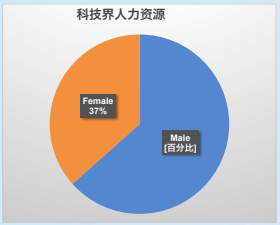
How far it is to reach our goal?

- For all the efforts on SDG 5, we should know firstly the current status of women, especially women in science & technology, to find out feasible paths for our goal.
- China is a country with the largest population and also the largest numbers of women professionals in STEM field. The challenges and experiences could be useful for sharing.

What is the Status of Women ?

- China is the country with No. 1 population in the world. The women of Science &Technology in China has also the largest number. Here, the data is from the report of the China Ministry of S&T in 2016.

Chinese Women data in S&T （2014）



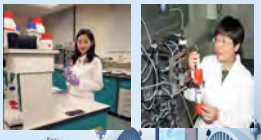
Total No: 81,140,000 (100%)
Male: 51,427,000 (63.4%)
Female: 29,713,000 (36.6%)
The data comes from the graduates and undergraduates

Female %

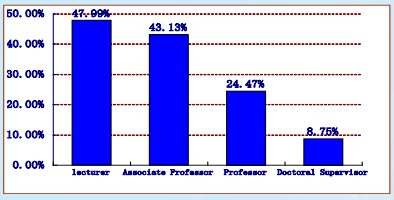
No.	Types	Female %
1	Undergraduate	51%
2	Post Graduate	49%
3	Female Researcher	40%
4	Top Scholars	5.6%

Statistics of women in Engineering and Science (2015)

- In China, it takes about 30,000USD to cultivate one BSc graduate. The cultivation cost of a MSc or PhD student is higher.
- 36% of the scientific and technical staffs are women
- 67% of them have BSc & BE degree,
- 6% have master degree.

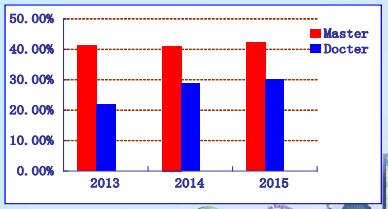


The Proporion of Female Full-time Teachers and Researchers in a 985 University in China (2015)



Statistics of Chinese women in Engineering and Science (2015)

The Female Postgraduate data of a 985 University



Women in political positions (2000~2009)

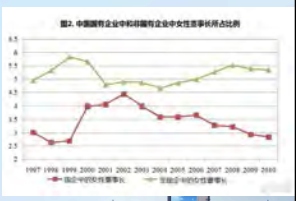
Year	Province	Cities	Couties
2009	11%	13.70%	16.60%
2000	8%	10.80%	15.10%

2009年，正职女干部在同级正职干部中的比例分别为：省部级以上7.3%、地市级10.4%

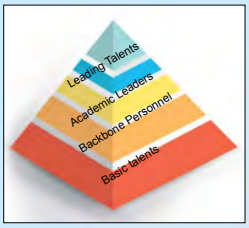
第十八届中央委员中，女性10名，比例为4.9%；在中央政治局委员中，女性仅刘延东、孙春兰两人

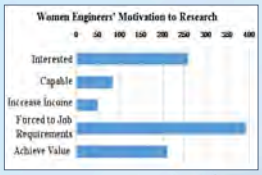
各民主党派现任中央委员会组成人员中，女性352人，占总数22.4%

Statistics of female CEOs in Chinese enterprises



Why the Career of Women is so hard?





- Women engeneers are lack of motivation to research under the current system and the environment

Why the Career of Women is so hard?

- Long time social culture
- Family education and expectation of parents
- Women's physiological reason and family responsibilities
- Public services have lagged behind
- Retirement system (Majority of Chinese professional women retired at 50~55 years old , men retire at 60 yrs)
- Social culture

Less Opportunities for Women to have Career Promotion

- Entry Level of a company, Male% /Female%=52% / 48%;
- Manager Level: Male%/Female% = 62% / 38%;
- VP Level: Male% /Female% = 71% /29%;
- SVP Level, Male% / Female% = 76% /24%
- C-SUITE Level, Male% / Female% = 77% /23%

Women has much less opportunity to have internal promotion like men, although when they enter the workforce, in about equal number.

What Women Lose when not being in Power ?

- The direct expression of power is economic status. Promotions to management positions means the payment rise, which bring the decrease of women's income. The gap known academically as the "gender wage gap".
- Men dominate the politics, culture, family, society, administration, private sector, etc.
- Without the financial independence, women can only depend on men in the family.

Why we need "Women in Power"?

Remarks of UN Secretary General, António Guterres:

- Gender equality is fundamentally a question of power, as we still live in a male-dominated world with a male-dominated culture.
- When women have equal opportunities at work, development accelerates tremendously.
- And we also need change in power relations to advance peace and security for all, as gender equality is a key instrument of peace and security.

Women in Power, How to be in Reality

- Firstly, we need fair policies for women, from government and companies/universities. The women has play an important function not only for families but also for social society. Its responsibility should be shared.
- The current retirement policy in China should be changed as women retire 5 years earlier than men.
- Encourage and training women for their capability of leadership.

Specialties of Women

- Their natural intuition allow them to capture the fact behind the scenes according to the feeling;
- Determination - have a sense of urgency, dare to break the routine
- Social skills - better understanding of human nature, communication and coordination skills
- Natural love - compassionate, love to help others
- Care for the environment - naturally close to nature.

Women's Disadvantage

- Lack of self-confidence. High dependence & strong obedience on their boss or male colleagues;
- More focus on the details and without consideration the key points. "It is my boss's business not mine"
- Not wide mind, more emotional.

Women's disadvantage

- Most women not participate very often the social activities. The private message between females become the only way to communicate. More gossips in the company or divisions dominated by females.
- Some females can accept their male colleagues to get promotion, but not the female in the same position, because it hurt their self confidence.

Opportunities for Woman to be successful

- Mentor is the key point.
- First of all there should exist the opportunity, and then can we explore, The favor and promotion from important figure can greatly accelerate the growth of young people.
- There will be more opportunities when you maintain active participation in social activities.

Never be too late to go ahead

- You would never know how far you can go in your life. You could realize much higher value than you expected
- In this world, it is never too late for you to make decisions.
- Be independent, be yourself.

Thank You for Attention

The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Session 2: Career Development Programs for Next Generations

次世代キャリア開発プログラム

Session 2 Chair (Korea)

Heisook LEE
Principal Research Fellow, GISTeR, KOFWST
Professor Emeritus, Ewha Womans University

Education

Degree: B.S.(With Distinction), Mathematics, Ewha Womans University, Seoul, Korea, 1971
Degree: M.Sc. in Mathematics, University of British Columbia, Canada, 1974
Degree: PhD, in Mathematics, Queen's University, Kingston, Canada, 1978

Research Field

Associative Algebras, Applied Algebra, Algebraic Coding Theory
Science Policy: Gendered Innovations, HRD in STEM, Science Education, Science Communication

Career History

Major Faculty Appointments at Ewha Womans University
1988-2014.2 Professor, Department of Mathematics
2007.8-2010.7 Dean of College of Natural Sciences
2006.8-2008.7 Dean, Graduate School,
2002-2010 Founding Executive Director, Center for WISE
1998-2001.1 Dean, International Educations Institute
1997.3-2001.1 Dean for Research Affairs
1995.9-1997.2 Dean of College of Natural Sciences

2011.1-2016.3 President of Center for Women in Science, Engineering and Technology(WISET)

Appointments

2017.3-2019.2 WE-UP Professor, Handong Global University
2013.9 -2014.9. Member of Presidential Advisory Council on Science & Technology
2010.10 - 2013.2. Member of National Science & Technology Commission
2012.7-2018.10. Board Member of KAIST
2013.6-2017.6 Audit of Pohang university of Science and Technology
2012. 6-2015.4 Science Committee member of Korean National Commission for UNESCO

2009. 6 - 2011. 6. Board member of National Research Foundation

2008.1 - 2011.2. Vice President, Korea Federation of Science &Technology Societies

2006.1 - 2007.12. President, Korean Federation of Women's Science and Technology associations

1994.10 - 1996.12. Chief Editor of Journal of Korean Mathematical Society

1888. 10 - 1990.10. Chief Editor of Communications of KMS

Awards

2016.11 Samsung Awards for Creative Womon Leader

2014.10 Acievement Award, Korean Women in Mathematical Sciences Society

2014.2. Okjo Geunjeong Medal by the President of Korea

2008. 10 Achievement Award, Korean Mathematical Society

2007.12 Seoul City Culture (Natural Science Field) Award

2006. 12 Duke of Edinburgh Fellowship, Korea British Society

2003 The Year Award for Woman in Science & Engineering of the year, Minister of Science and Technology

2003 National Science Medal, President of Korea

Current Memberships

Mem.: Korean Mathematical Society, Korean Women in Mathematical Sciences Society,

KOFWST (Korean Federation of Women's Science & Technology Associations),

KOFST (Korean Federation of Science & Technology Societies)

Session 2 Speaker (Japan)

Rie YAMAGUCHI
Diversity and Inclusion Consultant
Japan Network of Women Engineers and Scientists

Education

Sept 1991 – Dec 1992
Master of Science (Computer Science)
University of Southern California

Career History

June 2010 – Present
Diversity and Inclusion Consultant
・Undertake training to parents dealing with career and child-raising
・Undertake training to managers dealing with empowerment female employees

May 2006 – June 2010
Business Cube and Partners
・Marketing Senior Director

Apr 1984 – Jan 2006
Hitachi,Ltd. Software Division
・Software Planning
・Software Development

Joined a general electronics manufacturer in 1984 and engaged in software development, design and product planning for 24 years.
Took childcare leave twice and work as a general manager.
In June 2010, became an independent consultant and now provided more than 200 seminars in a year.
Book:" Let's start after childcare leave" "Communication that makes use of childrearing employees"

Current Memberships

JWEF Member,

Work-Style Reform and Women's Career Promotion as a National Policy and Efforts to Practical Solutions in Companies

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Japan Women Engineers Forum, 2-1-30, Kudan-Minami, Chiyoda-ku, Tokyo 102-0074, JAPAN,
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Abstract: In 2016, the Act on Promotion of Female Participation and Career Advancement in the Workplace was established in Japan. Also, the Acts to Promote Work Style Reform took effect in 2019.

According to these laws, efforts to promote female careers in companies have been actively carried out. In particular, female employees who return to work after childcare leave after childbirth and continue to work are increasing year by year, and trial and error continue how to support activities for employees who work differently than before in the workplace.

The author joined an ICT company in 1984 as a new graduate and worked for 24 years after having taken childcare leave twice. Encountered various problems in balancing work and childcare, and then experienced a managerial position. Served as a leader of the Women's Achievement Promotion Project for two years from 2006, also had the opportunity to practice problem-solving as the promotion side.

Based on these experiences, the author has provided practical information to organizations and individuals as “Diversity and Inclusion Management Consultants”. This paper introduces the background behind these activities and to provide the latest status of women's career promotion in STEM field In Japan.

Keywords: Work Style Reform, Women’s Career Promotion, Childcare Leave, Gender Equality, Work Life Balance, Diversity and Inclusion Management

1. Executive Summary

In 2016, the Act on Promotion of Female Participation and Career Advancement in the Workplace was established in Japan. And also, the Acts to Promote Work Style Reform took effect in 2019.

According to these laws, efforts to promote female career in companies have been actively carried out. In particular, female employees who return to work after childcare leave after childbirth and continue to work are increasing year by year, and trial and error continue on how to support activities for employees who work differently than before in the workplace. The author joined an ICT company in 1984 as a new graduate and worked for 24 years after having taken childcare leave twice. Encountered various problems in balancing work and childcare, and then experienced managerial position. Served as a leader of the Women's Achievement Promotion Project for two years from 2006, also had the opportunity to practice problem solving as the promotion side.

Based on these experiences, the author has provided practical information to organizations and individuals as “Diversity and Inclusion Management Consultants”. I would like to introduce the background behind these activities and to provide the latest status of

women's career promotion in STEM field In Japan.

2. Introduction

There are few female engineers in Japan. According to the 2012 White Paper on Gender Equality published by the Cabinet Office, only 14% of Japanese researchers (including engineers engaged in development in companies) are advanced in international comparison. Near the lowest in the country. In addition, about two-thirds of male researchers belong to companies, whereas only one-third are female.

According to the survey results of the reasons why there were few female researchers, the most common answer for both men and women was “difficult to balance home and work” followed by “difficult to return after childcare” In terms of female responses, the top three reasons were related to family balance. From this, it can be easily imagined that improving the environment related to balance increases the number of female engineers and leads to success.

3. Approach and Methodology

There are the following two problems that women after childcare leave face back to work.

- Difficult to produce work results in a limited time
- Difficult to get an understanding from the workplace about working with the work-life balance support system

It is an urgent task for companies seeking to promote the active participation of women in order to make them aware of these issues during childcare leave or after returning to work, and how to deal with them.

The training program was devised. These are the “return to work seminar after childcare leave,” “seminar for managers,” “seminar with partner,” and “seminar for young female employees.”

3.1 Seminar for returning to work after childcare leave

3.1.1 Needs from companies

In companies where the number of employees returning to work from childcare leave is increasing, there are many cases where they are aware of the problem of how to work after returning to work. Two major problems are depending on the type of company.

The first is a company that wants to do something because employees who are raising children think of the use of the work-life balance support system as a natural right and tend not to be grateful for the surrounding coverage. This has been actively promoted "family-friendly" measures, but it is often found in companies that have a low "proportion of gender equality." For example, companies that have improved the childcare leave system and short-time work system in a direction that allows them to rest as long as possible, but still have a personnel management system by course.

The second is, in contrast, companies that are expected to produce high results even while raising children, and those who cannot do so feel extremely negative or cannot continue their work. This is high in “type of equality promotion” but low in “family-friendly” type

companies. Although there is a place to play an active part according to ability regardless of gender, there is still a strong idea that long working hours are natural and that working for a long time contributes to the organization.

In either case, the way the company has been so far has had a strong influence on the way employees think after childcare leave, so simply changing the mindset and awareness of female employees will not solve the problem. This is well understood by the person in charge of the personnel / diversity promotion department who is the client of the training, and the seminar is undertaken.

3.1.2 Seminar Program

At the beginning of the seminar, there is always time to explain the purpose of the seminar to managers above the Human Resources Department. The reason is that the person who has authority to say that the company expects the success of employees who are raising children in the future, and of course, can improve their careers, as long as it seeks the results of their work in a high load of balancing work and childcare. This is because it is necessary to have a declaration. This affects that the seriousness of the company is communicated to the students and has a positive effect on the attitude of attending the seminar.

In lectures on attitudes to balancing work and childcare, even if there is a period when the burden of childcare is temporarily high, it is noticed that there is a period of work over a long period. This lecture can contribute to Students who are busy with day-to-day childcare tend to be unable to draw a vision of their future career, but this approach makes it possible to grasp the current situation objectively from a long-term perspective.

3.1.3 Cooperation with partners and family

Women are more likely to choose time-restricted work styles when they return to work, but at the same time they tend to think that childcare and housework should be primarily responsible. However, as a matter of course, it is impossible to play an active role at work, aiming at a high level of childcare and housework. Therefore, he explains the necessity of sharing childcare between couples. In particular, the emphasis is on the necessity of sharing between the nursery school and the sharing of the call handling and nursing when the child is ill.

If the same person（a mother or a father） performs pick-up at a nursery school, it tells us that there is no freedom of time both in the morning and evening, and that the burden on both mind and body is heavy. We propose that both couples can pick the child up. It is not uncommon for the students to respond that they were unaware of entrusting them to their husbands because they believed that they were going to take care of the nursery. I was surprised by this reaction. This is because the couple who worked together around 20 years ago, such as my family, flexibly shared the nursery. However, as a real problem, as long as modern mothers are still bound by stereotypes.

3.1.4 Effect of seminar

In this training, the effect of changing the student's consciousness as follows is recognized, and high satisfaction is obtained every time.

- I thought it would be good to aim for higher working hours
- Because I was going to do all my childcare and housework even after returning to

work, it was an opportunity to think about what my husband would do

- I thought that I had to take care of my child
- I wanted to actively use home appliances and housework services
- I want to think about my future growth

In the future, we are considering the evolution of content that can be communicated to both men and women, based on the fact that male employees taking childcare leave are gradually increasing.

3.2 Seminar for managers

3.2.1 Background of starting seminar for managers

In 2012, a full-scale seminar for returning to work after childcare leave was started. There was a clear common point in the free description column of the post-seminar questionnaire for any company. That is, "I want managers to hear this story."

When the author first saw this impression, felt that it was difficult to squeeze the contents to be conveyed in the seminar for managers. However, because of the increasing needs, finally decided to provide it.

The research results of the Institute of Social Sciences, the University of Tokyo, published in 2013 summarizes what should be done to users of the short-time work system, and this was a great reference. In addition, the role-playing scenario created for the “Ikuboss Training Course” in April 2014 is now offered as a set with lectures. The number of requests for seminars for managers has increased rapidly since 2014, because the idea that “direct managers are the key to the success of employees after childcare leave” has been made known to corporate personnel. It was.

3.2.2 Seminar contents for managers

The following three points are the most important things to convey in the seminar for managers.

(1) To improve work efficiency throughout the workplace and promote work-style reform for all employees

(2) Do not lower the quality of work (difficulty) for subordinates who work in time-constrained ways (work volume is adjusted as necessary)

(3) As with other subordinates, develop future-oriented subordinates who are working with time constraints in a planned manner.

In order to carry out the above (2) and (3), communication between the supervisor and subordinates during childcare is essential. However, some managers give too much consideration to subordinates who are raising their children (excessive consideration), making it challenging to assign jobs appropriately and give them opportunities to encourage growth. Many people feel it. Therefore, we have devised and proposed the return-to-work interview sheet as a communication support tool. It is the same as the one made for cafe participants after childcare leave.

This sheet is composed of items for knowing what kind of work environment the subordinates work after returning to work after childcare leave, and enthusiasm and requests for work, and covers information that the subordinates should convey to the supervisor during

the interview. Yes. By knowing such information specifically by the boss, it is possible to estimate the burden of subordinates who are raising children, not knowing only at the workplace.

3.2.3 Role-playing between managers and subordinates

Managers are lack of knowledge for how to communicate with subordinates who were raising children. They need to get hints by having a conversation with a subordinate during an interview. Therefore, we devised role-playing that consists of a set of three people: a supervisor, a subordinate, and a referee who observes the correspondence of the supervisor.

Seven examples of interview scenarios were created as lisited below.

1. Report of pregnancy from female subordinates
2. Consultation on childcare leave acquisition from male subordinates
3. Talk with subordinates returning from childcare leave
4. Consultation from subordinates one month after returning to work
5. Complaints from colleagues of short-time workers
6. Consultation to increase workload for short-time workers
7. Talk to a child-caring subordinates

The most commonly used are 3, 4, and 5. The purpose of 5 is that a colleague working with a subordinate who is raising a child and working with a short-time work system is annoyed because the workload increases due to the short-time work. Some managers have experienced this, and people often hear about their feelings.

Role-playing is very exciting every time, and even after the end, participants can discuss their thoughts and communicate more actively, and satisfaction is high.

3.2.4 Effect of seminar

The managers who attended the seminar expressed the following impressions and thought that the original purpose was achieved.

- I was too careful about my subordinates
- I learned a lot from what I heard for the first time
- I want to improve long working hours for employees without time constraints
- I want to incorporate a return-to-work interview sheet
- Role-playing was helpful

As future issues, we would like to add items such as evaluation methods for subordinates who are raising children and the prevention of maternity harassment.

4. Conclusions and recommendations

For seven years since 2012, we have provided training (seminars) for corporations. In the last few years, there has been a significant movement in promoting women's active participation and work style reform, and the workplace is changing at an unprecedented rate. The government started to discuss the upper limit on working hours. Workplace problems that make it difficult for women to work are rooted in Japanese employment practices, which existed 30 years ago, and have continued for a long time. However, as if it were a heavy stone that began to roll, reforms that began to move in a specific direction would increase in speed and never go back.

In the future, based on the efforts so far, we plan to enhance training to cultivate female manager candidates and support for female leaders to play active roles as management.

The speed of change varies from company to company and individual, and there is resistance from the layer that loses vested interests. Based on this situation, we will continue to provide optimal solutions that meet the needs of the workplace in order to create a workplace where all working people, including women who work while raising children, can demonstrate their abilities naturally.

Work-style Reform and Women's Career

Practical Solutions in Companies

October 11th 2019

Rie Yamaguchi (Japan)

Today's Topic

- Introduction
- "Work-style Reform" in Japan
- Practical Solutions in Companies
- Conclusion

INTRODUCTION

Self Introduction (1)

- Born in 1961
- Graduated from Tsukuba University, majored in Computer Science
- Entered Hitachi, Ltd. as an software engineer in 1984

--- Equal Opportunity Law 1985 ---

--- Child Care and Family Care Leave Act 1991 ---

- Engaged in software development team

Self Introduction (2)

- Gave birth in 1994 : child care leave by one year old
- Back to work in 1995 and entered so-called mommy track (by 1998)
- Gave birth in 1996: child care leave by four month
- Promoted to a managerial post in 1998
- Worked as a manager and then senior manager in the product planning section

Self Introduction (3)

- Nominated a Diversity and Inclusion Project Leader in 2006
  - Realized that mommy track problems still unchanged
  - felt responsible in part for the situation as a first-generation
  - My daughter was 10 years old at that time and I did not want this problem remain pending in her future
- Started Independent consultant in 2010

”WORK-STYLE” REFORM IN JAPAN

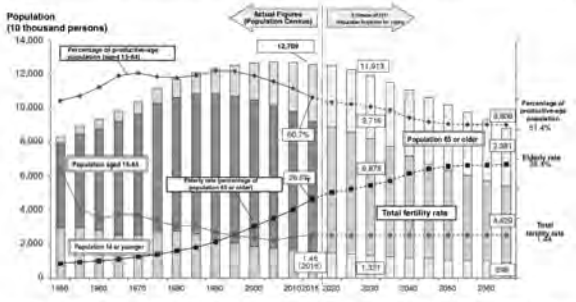
Why Work-style Reform

In Japan

- Birthrate is declining
- Aging population increasing
  -> Labor force is declining rapidly
- We need
  – To expand employment opportunities for more people
  – To maximize their motivation and ablities

Population Trends of Japan

The population of Japan has been entering a declining phase in recent years. In 2065, it is estimated that the total population will fall below 90 million and the aging rate will be in the 38% range.



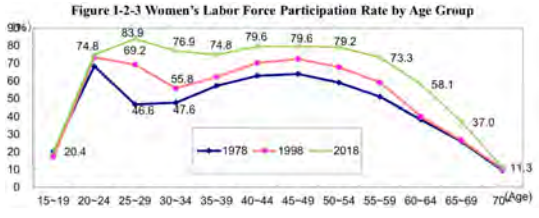
Sources: "Population Census", Ministry of Internal Affairs and Communications; "Population Estimates (estimated in 2017); Medium-Fertility/Mortality Projections" (population as of October 1 of the respective year), National Institute of Population and Social Security Research and "Vital Statistics", Vital, Health and Social Statistics Office to the Director-General for Statistics and Information Policy, Ministry of Health, Labor and Welfare

What is Work-style Reform

- Redress long working hours
  – Engaging women and elderly in work
- Create environment for easier changing jobs
  – Establishing universal rules for dismissals
  – Supporting career changes
- Redress disparities
  – Equal pay for equal work
  – Narrowing gaps in working conditions between regular and non-regular workers

Japanese Women in Workplace Each Age Group

Figure I-2-3 Women's Labor Force Participation Rate by Age Group

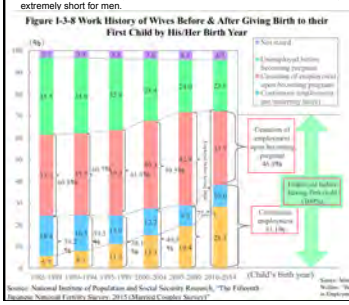


Source : White paper on gender equality 2019

Japanese Women in Workplace After Giving Birth

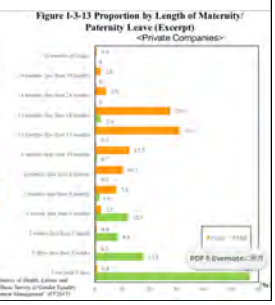
・The proportion of women who continue to work before and after giving birth to their first child increased from around 40% to 53.1%.
・The ratio of men taking paternal leave increased but remains low. The length of leave is less than one year or longer for women, extremely short for men.

Figure I-3-8 Work History of Wives Before & After Giving Birth to their First Child by His/Her Birth Year



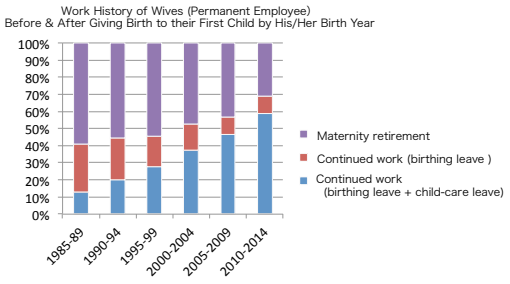
Source: National Institute of Population and Social Security Research, "The Fifteenth Japanese National Fertility Survey, 2015 (Married Couples' Survey)"

Figure I-3-13 Proportion by Length of Maternity/ Paternity Leave (Excerpt)
<Private Companies>



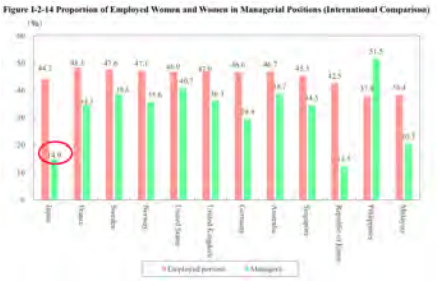
Source: Ministry of Health, Labour and Welfare, "Basic Survey of Gender Equality in Employment Management" (FY2015)

Japanese Women in Workplace
After Giving Birth（Permanent Employee）



Japanese Women in Workplace
Managerial Positions

While there isn't a large discrepancy in the proportion of women employed between Japan (44.2%) and other countries, the proportion of women in managerial positions in Japan (14.9%) is lower than other countries.



Source : White paper on gender equality 2019

Japanese Women in Workplace
Solutions from My Viewpoint

- To address engaging women in workplace, It is necessary to increase managerial position women in everywhere
- Only experienced employee can promote to managerial positions
- For women in 20s to 40s, which are very important period for their career, giving birth and child-raising are highly important issues for their entire life
- They thought it should be almost impossible to both raise children and become managers, but I know they can because I did
- Therefore I developed Corporate in-house training for mothers which enables both child-raising and career enhancement

PRACTICAL SOLUTIONS IN COMPANIES

Practical Solutions
Corporate in-house training for mothers

- Main Target
  - Working at private companies or public organizations
  - Permanent employed
  - Willing to continue working
  - Partners also employed
- Contents
  - Raise awareness of their career
  - Encourage communication with their bosses and colleagues
  - Inform importance to collaborate in child care and house management with their partners

Practical Solutions
Impressions from Trainees

- Satisfaction level was very high
- Impressions

" It would be good to aim for higher working hours"

" I was going to do all my childcare and housework, but it was an opportunity to think about what my husband would do"

" I thought that I had to take care of my child only by myself but I can call help"

"Interested in home appliances and housework services!"

"I need to think about my future growth"

"I want managers to hear this story"

"I think my boss should take this training"

"Please give this training to our bosses"

Practical Solutions
Corporate in-house training for Managers

- Main Target
  - Managers who's subordinates are pregnant or child-raising
- Contents
  - Give chances to child-raising workers to prove their selves
  - Consider to time constraints of child-raising
  - Keep good communication with child-raising workers
  - Interview child-raising employees and ask what kind of managerial support is helpful for both child-raising and career enhancement
  - Roleplaying
  - Case Study

Practical Solutions
Impressions from Trainees

- Satisfaction level was very high
- Impressions

"I was too careful about my subordinates but now I know it was too much"

"I learned a lot from what I heard for the first time"

"Roleplaying was helpful"

"Since I do not want to be doubted to sexual/power/maternity harass, difficult to ask private issues to my subordinates"

Practical Solutions:
Back-to-work Interview Sheet

- Most Efficient tool I created : "Back to work Interview Sheet"
- It contains working conditions of workers which bosses should know to assign appropriate about of job to them.
- Since the managers feel fear for harassment charge too much, this kind of guideline is very helpful.
- This sheet is very popular and have been introduced to major companies.
- It includes commuting time, nursery school location, partner commitment, parents cooperation, and so on.

Working Conditions of
Child-raising Employee

	Condition	Effect
1	Commuting time（where you live）	Work Hours*
2	Location of your nursery, how much time the child spend at the nursery	Work Hours
3	Your spouse's work hours/work style, How housework is shared	Work Hours/ Time-off frequency
4	Support from your parents/Services available for use	Work Hours/ Time-off frequency
5	Health of your child/ren	Work Hours/ Time-off frequency

Practical Solutions
Up-to-date Corporate in-house Training Menu

- Unconscious Bias Seminar for Managers
  - What is unconscious Bias
  - Examples of unconscious Bias
  - How to avoid negative effect to recruiting and promoting?
- Promoting paternity leave
  - Management challenge
  - Fathers' challenge

CONCLUSIONS

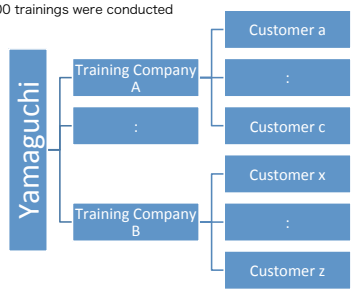
Conclusions

- Work-style Reform is Urgent Problem in Japan
- From my own experience, I have been developing practical solutions for employed mothers and fathers which is one of the most challenging part of Work-style Reform
- Corporate in-house training has been proved to be effective
- “Back-to-work interview sheet” is supporing managers a lot
- I believe women proportion of Managerial position rate achieved to be 30% soon

Thank you!

Business Model

In 2018 about 200 trainings were conducted



Session 2 Speaker (Korea)

Suk Kyeong Lee
Professor, the Catholic University of Korea, School of Medicine

Education

Degree: B.S. (graduate summa cum laude) Seoul National University/ College of Pharmacy, Seoul, Korea, 1986

Degree: M.S. in Pharmaceutics) Seoul National University/ College of Pharmacy, Seoul, Korea, 1988

Degree: Ph.D. Molecular Pharmacology and Biological Chemistry, Northwestern University Medical School, Chicago. U.S.A, 1994

Research Field

Mechanistic role of virus in tumorigenesis

Noncoding RNAs (miRNA, long noncoding RNA) network in tumor and immune disorder

Effect of sex/gender on pathology and treatment

Career History

1994.6-1997.2	Post Doc, Northwestern University Medical School
1997.5 -2004.2	Assistant professor, College of Medicine, The Catholic University of Korea
2004.3 -2009.2	Associate professor, College of Medicine, The Catholic University of Korea
2010.3- present	Full Professor, College of Medicine , The Catholic University of Korea1

Appointments

2017.3- present	Animal research ethics committee (Gachon University
2017.10- present	Board Member of IRB (The Catholic University of Korea)
2017.11~2018.10	Committee on the Fourth Industrial Revolution
2018.10- present	Committee on the talented young generation for the future
2018.11- present	Board member of National Research Foundation

Awards

2015: Presidential Award (improving gender equality)

Current Memberships

KOFWST (Korean Federation of Women's Science & Technology Associations)

Korean Society for Molecular and Cellular Biology

Korean Society for Biochemistry and Molecular Biology

The Korean Cancer Association

The Pharmaceutical Society of Korea

American Society for Microbiology

International Association for Research on EBV and Associated Diseases

Women's Bioscience Forum

The KOFWST's Journey to Foster Females in STEM fields

Suk Kyeong LEE
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Abstract: The scarcity of female STEM role models negatively influences girls in two ways. First, when girls consider entering higher schools such as universities or graduate schools, choosing STEM fields is not reinforced by respected role models. Second, the lack of female role models solidifies somewhat negative stereotypes held by girls and young women about STEM fields. KOFWST (the Korea Federation of Women's Science and Technology Associations) composed of 65 member organizations in the field of S&T has tried to encourage girls in entering to STEM fields. The KOFWST has published biography series 'Women in Science' about Korean women in STEM fields and the scientific careers they have pursued with passion. In addition, Korean editions of 'Women's Adventures in Science (Volume 1~10)' by National Academy Press have been published. The authors and translators of those books gave lectures to girl students to convey their lively stories about their dreams and experiences in the path to fulfil their dreams. To fix the women's problems in S&T, girl friendly science education and programs for promoting and keeping more women in S&T are urgent. Many problems are rooted on the fact that women have been excluded from the decision making and the positions in charge of managing research projects and institutions in S&T. To overcome this problem, the KOFWST has run 8 week female leadership program since 2015. Cumulative total about 150 female S&T personals have benefited from the programs to cultivate their leadership and to establish network with other female leaders in STEM fields. This paper overviews the KOFWST's journey to inspire girls to enter to STEM fields and to help female S&T scientists to grow as leaders in the society.

Keywords: STEM, Role Model, Book Talk, Female Leadership, Women in Science and Technology

1. Introduction

The Korea Federation of Women's Science and Technology Associations (KOFWST) was established in 2003 with 4 associations for the purpose of fostering alliances among women's science and technology organizations. The mission of KOFWST is to enhance status of women in science and technology, to achieve equal employment of women in science and technology, and to expand national capacity of science and technology. As of September 2019, KOFWST consists of 65 member associations: 23 women's committee, 9 general, 3 regional, 9 vocational, 14 society, and 7 cooperative members.

Activities of KOFWST include supporting associations in science and technology, annual conference, leadership program for women leaders in the science and technology field, forums, international cooperation, laboratory safety management for women scientists, fellowship award programs, publications, gendered innovations in research, and social responsibility programs.

This paper summarized stepwise activities of KOFWST to foster women in S & T for career development. First of all, KOFWST tries to encourage girls to enter STEM fields by publishing books providing role models for girls.

2. Career Guidance Program

KOFWST tries to encourage girls to enter STEM (Science, Technology, Engineering, and Mathematics) fields by publishing good science books. For this purpose, KOFWST have renowned female scientists to write about their stories to let girls know what they experienced and how they achieved their dream. KOFWST also has translated English biographies of respectable foreign female scientists in Korean so that girls as well as boys can read and learn from their lives. The authors and translators of the books also have visited middle/high school to give lectures regarding the books and share their own stories with the students. In addition, book essay contests have been held every year for students who read the books KOFWST have published.

2.1 Publishing Books in STEM

Research on the gap between men and women in STEM fields points out the paucity of role models for girls when they consider STEM careers. KOFWST tries to encourage girls to enter STEM fields by publishing series of books regarding female STEM scientists.

KOFWST has published books such as 'The Only Woman in the Room' by Eileen Pollack, Korean Edition (2015), 'Women's Adventures in Science (Volume 1~4)' by National Academy Press, Korean Edition (2016), 'Women in Science' (2016), 'Women's Adventures in Science (Volume 5~10)' by National Academy Press, Korean Edition (2017), 'Women in Engineering' , Korean Edition (2017), 'Women Entrepreneurs in S&T' (2018), and 'Women Scientists – Reflections, Challenges, and Breaking Boundaries' by Magdolna Hargittai, Korean Edition (2019).

In 2017, the first book of 'Women in Science' series was ranked among the 10 best sellers in science sector. The same book was also designated as 2017 Sejong Book, a privileged book award granted by Ministry of Culture, Sports, and Tourism. Five authors were invited to give lectures at Seoul Science Center.

2.2 Author Lecture Series

Book Talk series has been carried out to reach out girls and to give them chances to meet female scientist role models in person. The authors and translators of the books KOFWST published visited middle/high schools, gave lectures regarding the books, and shared their own stories with the students.

In 2017, 11 female scientists visited 4 middle schools and 4 high schools scattered in various provinces. In 2018, 11 female scientists visited 5 high schools where they graduated from. Over 1,000 girl students who were interested in STEM fields had met the female STEM researchers and listened to what the role models have experienced and how they reached where they are now.

2.3 Book Essay Contest for Students

Book essay contests have been held every year for students who read the books published by KOFWST. In 2017, 18 middle/high school students were selected and awarded for their book essays. In 2018, 36 out of 152 book assays were chosen as awardees. Prizes were also given to two of the schools where many good assays were applied from.

3. Career Advancement Program

KOFWST have developed an 8 week leadership cultivating program and trained women leaders since 2015. The leadership program pursues 1) to strengthen leadership of female S & T personnel who are in the pre-participation stage of major committees as well as women science leaders in the early stages of committee participation, 2) to boost cooperation between S & T leaders and public leaders, 3) to establish the nation's best technology and policy network for female leaders in STEM fields.

As present Korean government aims to fulfill 40% female ratio in every governmental commission, many female STEM scientists who were trained in KOFWST leadership program have been newly appointed as government committee members.

3.1 Leadership Program in Science and Technology

The first leadership program aimed for ‘Leadership Development & Training’ and 30 female scientists participated in that in 2015. Total 26 members participated the second leadership under the subject of ‘The Essence of Leadership’ in 2017. In 2018, there were the third and fourth leadership programs. Thirty six female scientists participated the third program for ‘Public Leadership’, while 30 members joined for the fourth leadership program under the subject of ‘Public Leadership in the Fourth Industrial Revolution’. This year, 29 STEM scientists were trained in the fifth leadership program for ‘Public Leadership in the Transformation Era’.

A scientific leader today is required to be not only an excellent researcher, but also a good manager. To be a leader in the society, scientists need to gain the experience and ability to analyze various information and then to integrate them into a policy. KOFWST are helping female scientist for that by running the leadership program.

The KOFWST's Journey to Foster Females in STEM Fields

Suk Kyeong Lee
Department of Medical Life Sciences, Department of Biomedicine & Health Sciences
College of Medicine, The Catholic University of Korea

The 9th Japan-China-Korea Women Leaders Forum for Science & Technology on Oct. 11, 2019

KOFWST KOrea Federation of Women's Science & Technology Associations

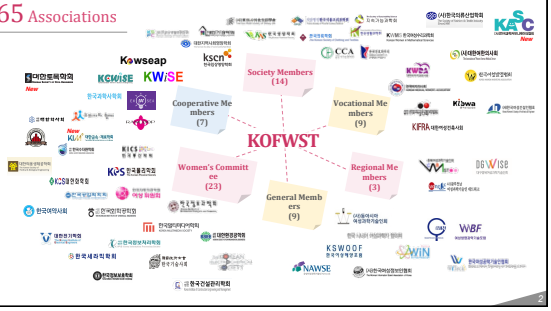
KOFWST was established in 2003 with ***4 associations*** for the purpose of fostering alliances among women's science and technology or ganizations.

The mission of KOFWST is to

- enhance status of women in science and technology
- achieve equal employment of women in science and technology
- expand national capacity of science and technology.

The number of members of KOFWST as of October 2019 are ~ *75,000* from *65 associations*.

65 Associations



Activities

- **Supporting Associations in S&T** — 43 projects in 2019
- **Annual Conference** — since 2006
- **Leadership Program** — for Women Leaders in S & T
- **Forums** — S&T, Policies, Industry 4.0...
- **International Cooperation** — Korea-China-Japan, EKC, CKC, UKC, AKC and GNet...
- **Laboratory Safety Management** — for Women Scientists
- **Fellowship Award Programs** — Excellence Award for Young Scientists...
- **Publications** — *Women Meet Science, Women at the Heart of Science...*
- **Gendered Innovations in Research** — Policy Development to Promote Gender-based Research
- **Social Responsibility Programs** — Volunteer Education Programs & Scholarships for Migrant Youths

Career Guidance Program

◀ Publishing Books in STEM
to encourage more girls to pursue STEM fields

Author Lecture Series ▶
giving lectures and sharing their own stories with students

◀ Book Essay Contest for Students
honoring students who read the books KOFWST have published and wrote essays

Publishing Books in STEM

Research on the gap between men and women in STEM fields points out the paucity of role models for girls when they consider STEM careers. KOFWST tries to encourage girls to enter STEM fields by publishing series of books regarding female STEM scientists.

2005

「Women Meet Science」
Introducing 61 women in science and technology

2006

「Women at the Heart of Science」
Introducing 24 women in science and technology

2007

「Delicious Jobs in Science」
Introducing 140 jobs in science and technology

Publishing Books in STEM

2008

「Waiting for tomorrow's Marie Curie I」
Celebrating Women of Outstanding Achievement I

Introducing 24 women in science and technology

2010

「Waiting for tomorrow's Marie Curie II」
Celebrating Women of Outstanding Achievement II

Introducing 24 women in science and technology

2011

「Who's Next」 Volumes 1~4
Introducing 108 women in science and technology

Publishing Books in STEM

2015

「 The Only Woman in the Room: Why Science Is Still a Boys' Club – September, 2015 」
by Eileen Pollack (Author)

A bracingly honest exploration of why there are still so few women in the hard sciences, mathematics, engineering, and computer science

「The Only Woman in the Room 」
(Korean Edition)

2016

「Women in Science」
Introducing 5 women in science and technology

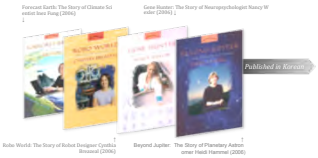
◀ Selected as a book of Culture & Education section for "2017 Saejong Doseo" hosted by Publication Industry Promotion Agency of Korea under Ministry of Culture, Sports and Tourism

Publishing Books in STEM

2016

National Academy Press,
「Women's Adventures in Science」
(Korean Edition)

Introducing 4 women in science and technology



Selected as a 2017 Excellent Science Book by KOFAC(Korea Foundation for the advancement of Science & Creativity) ▼

Publishing Books in STEM

2017

National Academy Press,
「Women's Adventures in Science」
(Korean Edition)

Introducing 6 women in science and technology

Selected as a 2018 Excellent Science Book by KOFAC(Korea Foundation for the advancement of Science & Creativity) ▶

Publishing Books in STEM

2018

「Women Entrepreneurs in S&T」
Introducing 5 women entrepreneurs in S &T

[Contents]

Bio Venture
... Finding the Hope of Intractable Diseases

Information security
... Management to crack passwords between people

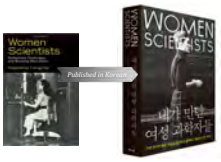
Science exhibition
... Reading mania adds story to science

Venture Capital
... From Doctor to Venture Capitalist

... Social venture
More girls to the wider world

2019

「Women Scientists 」 by Magdolna Hargittai (Author)
Interviews with over 100 successful women scientists from 18 countries



Author Lecture Series

Book Talk Series

2017

11 Female scientists visited 4 middle schools and 4 high schools scattered in various provinces

City	Time/Place
Incheon	10.17/ 제물포여자고등학교 girls MS
Daegu	10.19 / 효성여자고등학교 girls HS
Osan	10.23/성호중학교 MS
Daejeon	11.1/지족고등학교 HS
Daegu	11.21/경구중학교 MS
Gwangju	11.27/동신여자중학교 girls MS
Seoul	12.7/하나고등학교 HS
Gimhae	12.13/김해여자고등학교 girls HS

Author Lecture Series

Book Talk Series

2018

11 Female scientists visited 5 high schools where they graduated from.

City	Time/Place
Daejeon	5.9/ 유성여자고등학교 girls MS
Gwangju	5.16/ 금호중앙여자고등학교 girls HS
Yang Pyeong	5.29/양서고등학교 HS
Chun Cheon	6.1/춘천여자고등학교 girls HS
Seoul	9.21/정신여자고등학교 girls HS
Daegu	11.5/경덕여자고등학교 girls HS

Over 1,000 girl students who were interested in STEM fields met the female STEM researchers.

Book Essay Contest for Students

Book essay contests have been held every year for students who read the books published by KOFWST.

2017 ~ 2018

In 2017,

18 middle/high school students were selected and awarded for their book essays.

In 2018

36 out of 152 book assays were chosen as awardees. Prizes were also given to two of the schools where many good essays were applied from.

Career Advancement Program

Leadership Program in Science & Technology ▼

1st / APR 14 ~ JUN 8, 2015

2nd / MAY 15 ~ JUL 3, 2017

5th / MAR 25 ~ MAY 20, 2019

3rd / MAR 12 ~ APR 30, 2018

4th / OCT 15 ~ NOV 19, 2018

1st Leadership Program

APR 14 ~ JUN 8, 2015

The first leadership program aimed for 'Leadership Development & Training' and 30 female scientists participated in that in 2015.

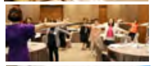
1기 프로그램 (2015년 4월 1일 ~ 6월 8일 / 매주 월요일)			
1주차 04/13	1교시	호크먼여성 리더십의 이해	강성희 CEO리더십연구소장
	2교시	성공하는 여성 리더의 기초	최정순 대일카네기코리아 대표이사
2주차 04/20	1교시	매력적인 여성 리더가 되려면	유인경 방송인
	2교시	우호적인 인간관계 증진	이미라 대일카네기코리아 이사
3주차 04/27	1교시	여성리더와 네트워크론	이은정 국민대 경영학과 교수
	2교시	격정 및 스트레스 극복	이미라 대일카네기코리아 이사
4주차 5/4	1교시	역사와 인문학으로 본 리더십	이은정 국민대 경영학과 교수
	2교시	말할한 협력방송 및 리더십 개발	최정순 대일카네기코리아 대표이사
5주차 5/11	1교시	스피치의 기술	강영은 MBC 아나운서
	2교시	명확한 의사전달	최정순 대일카네기코리아 대표이사
6주차 5/18	1교시	디지털 시대의 올린 리더십	홍은주 한양사이버대학교 교수
	2교시	건설적인 의견 제시	고상근 대일카네기, 서울대 교수
7주차 6/1	1교시	소통하는 글쓰기	제정임 세명대 저널리즘 교수
	2교시	창의한 동한 동기부여	이미라 대일카네기코리아 이사
8주차 06/08	1교시	공공리더십의 특징과 대응방안	강명자 전 환경부 장관
	2교시	팀워크 리더십 개발	이미라 대일카네기코리아 이사

2nd Leadership Program

MAY 15 ~ JUL 3, 2017

Total 26 members participated the second leadership under the subject of 'The Essence of Leadership' in 2017. In 2018, there were the third and fourth leadership programs

2기 프로그램 (2017년 5월 15일 ~ 7월 3일 / 매주 월요일)				
1주차 05/15	1교시	리더십 입문	강한 리더 - 현장에서 빛을 발하는 리더십	김성회 CEO리더십연구소장
	2교시	과정 소개	교육성과를 높이기 위한 목표수립과 동기부여	권오남 서울대학교 교수
2주차 05/22	1교시	리더의 교양	리더를 위한 인문고전	김 헌 서울대학교 인문학연구원 HK교수
	2교시	리더의 콘텐츠1	맛있는 글 요리하기 (과제 부여)	허두영 테크업 대표
3주차 05/29	1교시	리더의 경제상식1	경제에서 배우는 리더십	홍은주 한양사이버대학교 교수
	2교시	리더의 말하기1	매력적인 리더를 위한 성공적인 스피치법1	이은영 모아아카데미 원장
4주차 06/05	1교시	리더의 말하기2	매력적인 리더를 위한 성공적인 스피치법2	이은영 모아아카데미 원장
	2교시	리더의 시대정신	조선시대, 왕과 신화로 산다는 것	신병주 건국대학교 교수
5주차 6/12	1교시	리더의 전략	대왕 세종의 리더십	박현모 여주대학교 세종리더십연구소 소장
	2교시	리더의 경제상식2	거시경제 흐름 읽기: 대한민국 경제와 미래	홍춘욱 키움증권 연구원
6주차 6/19	1교시	리더의 법 이해	법의 지도	최승필 한국외국어대학교 교수
	2교시	리더의 콘텐츠2	과제첨삭, 콘텐츠 큐레이션	허두영 테크업 대표
7주차 6/26	1교시	리더의 듣기	소통하는 리더 (Action Learning)	이영민 액션러닝코리아 대표
	2교시	리더의 그릇	리더의 덕목 및 양성	김태완 서울대학교 교수
8주차 7/3	1교시	리더의 역할	정책결정 위치에서의 여성과학기술인의 역할	민경찬 연세대학교 명예특임교수
	2교시	과정 정리	교육성과 공유 졸업식	권오남 서울대학교 교수



3rd Leadership Program

MAR 12 ~ APR 30, 2018

Thirty six female scientists participated the third program for 'Public Leadership' in 2018

3기 프로그램 (2018년 3월 12일 ~ 4월 30일 / 매주 월요일)			
1주차 (3/12)	1교시	오리엔테이션	권오남 여성과총 부회장, 서울대학교 교수
		합리성과 감성의 거버넌스 리더십	김명자 한국과총 회장
	2교시	한국인의 탄생과 발견	최정운 서울대학교 외교학과 교수
2주차 (3/19)	1교시	패권의 비밀과 행복의 비밀	김태유 서울대학교 산업공학과 명예교수
	2교시	국가 과학기술 정책과 거버넌스	문미옥 대통령비서실 과학기술보좌관
3주차 (3/26)	1교시	양성평등정책과 여성리더십	민무숙 한국양성평등교육진흥원 원장
	2교시	리더의 성공적인 커뮤니케이션	김은혜 MBN 앵커
4주차 (4/2)	1교시	혼란의 시기, 생존과 선택을 위한 위대한 결정	배보경 IGM세계경영연구원 원장
	2교시	효과적인 구성원 관계 관리	
5주차 (4/9)	1교시	인공지능 핵심기술과 전망	이경일 솔트룩스 대표
	2교시	리더의 법적 책임과 역할	강한승 김앤장변호사
6주차 (4/16)	1교시	바이오산업과 규제	묵현상 범부처신약개발사업단장
	2교시	4차산업혁명과 새로운 인재의 조건	정두희 한동대학교 교수
7주차 (4/23)	1교시	부(富)의 삼원색	홍은주 한양사이버대학교 교수
	2교시	여성공공리더십	오종남 스크랜튼여성리더십센터 이사장
8주차 (4/30)	1교시	나눔의 리더십	안규리 서울대학교 내과학과 교수
	2교시	여성리더 특강	백희영 전 여성가족부 장관
	수료식	교육성과 공유 및 수료식	권오남 여성과총 부회장, 서울대학교 교수

4th Leadership Program

OCT 15 ~ NOV 19, 2018

The fourth leadership program under the subject of 'Public Leadership in the Fourth Industrial Revolution' and 30 female scientists participated in 2018.

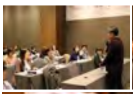
4기 프로그램 (2018년 10월 15일 ~ 11월 19일 / 매주 월요일)			
1주차 (10/15)	1교시	오리엔테이션 · 여성공공리더십	백희영 전 여성가족부 장관
		과학기술 정부 조직, 위원회, 거버넌스(토론)	유명희 여성과총 회장 노정혜 한국연구재단 이사장 문미옥 대통령비서실 과학기술보좌관 박상욱 서울대학교 교수 박수경 한국과학기술원 교수
2주차 (10/22)	1교시	디지털시대에서 과학기술 소통	이상욱 한양대학교 교수
	2교시	디지털 시대의 플랫폼 변화와 소통	정혜승 대통령 비서실 디지털소통센터장
3주차 (10/29)	1교시	인공지능과 함께하는 세상	이경일 솔트룩스 대표
	2교시	미래사회의 경제시스템	이원재 LAB2050 대표
4주차 (11/05)	1교시	블록체인 기술	엄경순 한국IBM CTO
	2교시	블록체인과 미래사회	인 호 고려대학교 교수
5주차 (11/12)	1교시	국가혁신체제 및 과학기술 정책	홍성주 STEPI 전략기획단장
	2교시	시민사회와 여성리더십	엄규숙 대통령비서실 여성가족비서관
6주차 (11/19)	1교시	빅데이터 분석을 위한 데이터마이닝 기술	김상욱 한양대학교 교수
	2교시	정보의 활용과 보호	권헌영 고려대학교 교수

5th Leadership Program

MAR 25 ~ MAY 20, 2019

This year, 29 STEM scientists were trained in the fifth leadership program for 'Public Leadership in the Transformation Era'.

일자	시간	강연주제	강연자
1주차 3/25(월)	17:00 - 18:30	오리엔테이션 및 수강생 자기소개	권오남 서울대학교 수학교육과 교수
		과학기술 정부거버넌스 소개	유명희 여성과총 회장
	19:30 - 21:00	과학기술 행정 및 정책	박상욱 서울대학교 지구환경과학부 교수
2주차 4/1(월)	17:00 - 18:30	성인지적 관점과 여성리더십	민무숙 (전)한국양성평등진흥원 원장
	19:30 - 21:00	여성과기인 커리어관리	엄미정 STEPI 연구위원
3주차 4/8(월)	17:00 - 18:30	과학기술 글쓰기	강원국 작가, 전북대학교 기초교양교육원 초빙교수
	19:30 - 21:00	과학기술과 국가경쟁력	김태유 서울대학교 산업공학과 명예교수
4주차 4/15(월)	17:00 - 18:30	뉴턴의 아틀리에	김상욱 경희대학교 물리학과 교수
	19:30 - 21:00	튜링의 아틀리에	유지원 타이포그래피 연구자, 디자이너
5주차 4/22(월)	17:00 - 18:30	초디지털 시대의 과학기술	백은옥 한양대학교 컴퓨터공학과 교수
	19:30 - 21:00		엄경순 한국IBM CTO
6주차 4/29(월)	17:00 - 18:30	Persuasive Presentation Skills	Ronald Lee Cahoon Presentation Consultant
	19:30 - 21:00		
7주차 5/13(월)	17:00 - 18:30	연구윤리는 왜?	윤태웅 고려대학교 전기전자공학부 교수
	19:30 - 21:00	인공지능 시대의 윤리학	이상욱 한양대학교 철학과 교수
8주차 5/20(월)	17:00 - 18:30	변환시대 여성과기인의 리더십	수강생 참여 토론
	19:30 - 21:00	알고리즘 시대의 뇌과학	김대식 KAIST 전기및전자공학과 교수



Activities

Supporting Associations in S&T
43 projects in 2019

Laboratory Safety Management
for Women Scientists

Annual Conference
since 2006

Fellowship Award Programs
Excellence Award for Young Scientists...

Leadership Program
for Women Leaders in S & T

Publications
Women Meet Science, Women at the Heart of Science...

Forums
S&T, Policies, Industry 4.0...

Gendered Innovations in Research
Policy Development to Promote Gender-based Research

International Cooperation
Korea-China-Japan, EKC, CKC, UKC, AKC and GNet...

Social Responsibility Programs
Volunteer Education Programs & Scholarships for Migrant Youths


여성과학기술인이 이어주는 무지개
산림청 국립목원 견학
2019년 5월 7일(금)


many
Thanks!

Session 2 Speaker (China)

Er-Fan Ju
Senior Engineer,
GE Toshiba Silicones, Resin/paint Marketing Director.

Education

Education Background :

Bachelor's degree : Graduated from East China University of Science and Technology, Major : Chemical engineering and technology .

Master's degree : Graduated from Shanghai Jiao Tong University MBA , Senior Engineer

Research Field

Innovation and research special chemical materials in the High performance application. Epoxy resin and amine, polyamide curing agent,Oxygenated Solvents and Anionic Surfactants in water-based Coating, Silicone Resin in TV-LED light diffusion application; Silane; siloxanes in 500°C heat resistant coating, Special functional additive for water-based electrolyte slurry in Lithium battery negative and ceramic diaphragm film.

Career History

1. Shanghai Coating & Paint Research Institute ----Technical Team Leader, Research Director,
Research in subject of epoxy resin and amine curing agent " Underwater Curing Coating " and " Wet Curing Coating ", Major application in marine , port , container , heavy duty coating , anti-corrosion area .As Team Leaders, research of Oxygenated Solvents in water-based Coating got satisfying result in 1991. Join the major project : Bao Steel Plant. Obtain the second Award of Shanghai Science & Technology Development in 1992.

2. Dow Chemical Company --- Great China Technical Manager

Technical Research & Developing for Epoxy resin formulation: Composite materials; Electronic laminate; insulation slurry; Mariner & Container Coating; Automobile Coating; CED Coating; Anti-corrosion Coating. Research on Oxygenated Solvents and Anionic Surfactants both products Focus on emulsion latex, water -based coating, functionality textile slurry .

Obtain Company Science and Technology progress two Awards in 1998.

3. GE Toshiba Silicone Chemical -----Great China Technical & Marketing Director

Silicone Resin; Silane; siloxanes; Coating Additive; leading China Marketing & Technical team support & developing new Biz in Great China , Developing Silicone resin in heat resistant coating in 500℃; silicone oil for personal care; LCD-TV, LED light diffusion application ; PI film of flexible copper clad laminate for electronics & insulation , composites & polymer industry ;silicone modified epoxy as major composites in wind mill , Silane functional additive for carbon fibre and UV resistance coating , technical support on formulation to adjust on curing agent , like Pt catalyst and amine special coating on the wind mill surface for UV resistance , water Repellent working on low temp. (-50C) , Obtain China Coating Science and Technology Awards in 2008.

4. Lithium battery Industry,

Technical Manager for Sanyo Chemical Special functional additive for water-based electrolyte slurry, developing formulation for negative and ceramic coating film, Research the influence of additive on Lithium battery properties have been examined by cyclic voltammetry discharge at constant current. non-ionic wetting agent and dispersing for carbon nanometre paste and stabilizer. Research different additive performance in Lithium battery non-Newtonian Liquid system .

Awards and Scholars

Obtain the second Award of Shanghai Science & Technology Development in 1992.
Obtain Dow Chemical Company Science and Technology progress Awards in 2000.
Obtain GE Company China Market New Technology Application Awards in 2008.
Obtain China Coatings Association Coating Science and Technology Awards in 2010.
Obtain China Coatings Association Coating Outstanding Talents Awards in 2015.
Obtain 40th Anniversary of Reform and Opening China Coatings Science and Technology Awards in 2019.

Current Memberships

Up to now, Social posts :

1. Expect of Shanghai government new project evaluation group ;
2. Expert of China Coatings Industry Association;
3. Expect of Chinese Society for Corrosion and Protection
4. Editorial board member of < China Coating >Magazine ;
5. Editorial board member of < China Coating Industry>Magazine ;
6. Editorial board member of < Shanghai Coating >Magazine ;
7. Shanghai Women Engineer Association , executive director

SHANGHAI NEXT GENERATION FEMALE ENGINEER CAREER PLANNING AND SUCCESS IN NEW HIGH TECHNOLOGY INDUSTRY

ERFAN JU
Shanghai Woman Engineer Association, Executive Director
jef2008jef@hotmail.com, 13916045398

Abstract: This paper explores Shanghai next generation female engineer career planning and development in the new high technology industry .The Global Gender Gap Report,2018, shows that females are underrepresented in more and more areas of work that require knowledge or skills in science, technology, engineering and mathematics (STEM). The female gender gap in the STEM is becoming more obvious. Indeed young females tend to be more reluctant to choose STEM and engineering jobs that are both intellectually and physically challenging. What have we done to change this situation?

As a professional female society organization, Shanghai Woman Engineer Association has implemented a series of actions since 2000. The young female engineer members share 65%. Eighty percent of these young female engineers are married and 70% with children. During the past decades, the Association has paid long-term attention to the physical and mental health of young female engineers as well as their career development. Based on the national regulation and developmental strategy, the Association helps young female engineers to analyze the requirement of the society and choose suitable jobs accordingly. Specifically, multiple channels have been established to help young female engineers to obtain technical skills for their jobs. In the high technology industry, the Association helps them set up proper career plans and achieve a successful career step by step. They also suggest young female engineers well balance the relationship between career and family. Most of young female engineers grow fast and become experts in their fields.
For example, in the Shanghai metro industry, many young Association members expressed that the Association help become Science and Technology (S&T) professional talent and get the win & win on both family and career.
At the same time, the Association also provide a platform on which young female engineers can share professional technical information, having entertainment together, and support each other. After enrolled in the association, many young female engineers not only become experts in the STEM area but also make great progress as leaders in the management filed. These progress and achievements make young female engineers really capable and enjoy the STEM and high technology jobs.

Keywords: young female engineers, female career values, balance, multiple way and different channel, technology expert, become Science and Technology (S&T) professional talent ,

Conclusion:

The balance is the gold ! Most of young female engineers are doing very well from the

following career balances:

Balance between national policy and the security of female job;

Balance between country development needs and young female's own advantages,

Balance between the high-tech emerging industry requirement and the young female's personal career development;

Balance working hours and careers with young female's marriage and give birth period,

Balance and succeed in changing different roles among the family, the career and society,

Balance and proper arrange time for young female own careers and the education of their children

上海市女工程师协会
Shanghai Woman Engineer Association

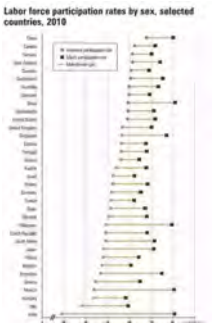
新兴产业中上海下一代女工程师的职业规划与成长
Career Planning and Development of the next Generation of female Engineers in Shanghai in Emerging Industries

Shanghai Woman Engineer Association
上海市女工程师协会 居尔蕃
Tokyo , Oct.10,2019, Ju Er-Fan
13916045309

Contents

1.1 China Young Women Career Development Situation

1.1Female labor participation rate in China



中国76%的劳动参与率，中国的男人的确很勤奋,养家意识非常强，劳动参与率高达90%。再看中国女人，真是惊叹啊，近70%的劳动参与率，世界第一,中国女人实在强悍得不止一点点！太了不起了。

China Labour force participation rate is more than 76%,

the Chinese man rate higher than 90%,

the Chinese womon rate is 70%, No, 1 on the world , the data shows Chinese women really amazing , outstanding !

1.2 Organizational guarantee for the Development of Professional Young Women in China

1.2中华全国妇女联合会All-China Women's Federation

The women's organization, established in March 1949, was defined as a non-governmental ,

Social function: repersentative and protect women and children's right and interests, Men and women are equal；rise up all Chinese Women's social position；educat women grow up and self-respect,confidence, self-improve, women have power of participate social mangerment,

中国女科技工作者协会China Women's Association for Science and Technology

The purpose: unite and support all Science and Technology felame worker , rise up the professional science and technology skill , make the great contribution for our country

1.3 The advantages of the Development of Young Professional Women in China

1.3 Chinese Professional Women and Wealth

In 2017, the Hurun Rich list released a list of self-made women from all over the world： 88 rich and powerful women from 12 countries are on the list, Chinese women hold 56 seats, up to 64% of the all. in the first place.

The advantages of the young women growth in China:

1.China's social system---Very democratic, equal, open and inclusive,There are various laws and regulations for protecting women.Women's desire for independence can be realized.,Even surpassing men in many areas.

2.Chinese women are generally highly educated--- These young women who graduate from university or college will be more diligent, independent, wise and thoughtful.

3.The EQ is high--- Chinese women seem to be naturally skilled at dealing with complex relationships. Balance the various relationship between family and occupation, It's a great test of EQ.

1.4 China Young Career female Development Situation

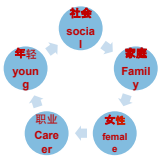
1.4 The young working women take multiple roles at the same time

1.年龄角色age role ----Their age 22-45 years old , young and have dream & target, also with liven and technology;

2.职场角色Career role ----not only a job make money but also successful in career

3.家庭角色Family role-----bear children , family balance, respect elders, to raise and educate a child, and have a full-time job

4.社会角色social role-----take responsibilty same as the man, achieved the world-famous China rise up with man together.



Chinese women, they're the freest, Self-reliance, The most independent, the best, the heart of struggle, most hardly. They should have more respect and applause than women in any country.

Contents

1.中国年轻职业女性发展状况
China Young Women Career Development Situation

2.上海女工程师协会为年轻女工程师职业规划所做的工作
Work done by SWEA for Young Female Engineers of Career Planing & Development

3.上海地铁发展中年轻女性职业平衡
Career balance of Young Women in Shanghai Metro Inductory Development

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Thoughts and think about on the career development of the younger generation Professional Women

会
Shanghai Woman Engineer Association

2.1The Development of Shanghai Women's Engineers

2.1Brief introduction of Shanghai Women Engineers Association (SWEA)

SWEA was founded in 1984.Since the establishment, they done lot of the innovation jobs, dig out and enrich the connotation of work.There are Sixteen technical academic groups and more than 500 members come from Industry: Aerospace, Aviation, Construction, Subway traffic,Chemical industry, Instrument, Phamacy, Medicine, Textile, Metallurgy, Light industry, Petrochemical, Engineering Project Supervisor etc.and so on. They are representative of excellent women's engineers in all major industries of Shanghai. 60% of them are young female engineers.

The SWEA actively cooperates with Shanghai Women's Federation and Shanghai Science and Technology Association, help the next Generation female Engineers to set up the career planning and become : A new woman who has made a contribution to society with a sound and physical healthy. These great young women's engineers, 80% have a family, 70% have children; They take care of both careers and families. In family:daughter, wife, mother, daughter-in-law etc., In career: Technical expert, Business Director,Chief Scientist, President in company, General Manager,Director of R & D etc. They are the elite of China's economic and social development!

2.2 Shanghai young generation Female Engineer career guidance and orientation

2.2 SWEA help young generation Female fixed career direction ,

It is important and necessary to provide ：Early career guidance, orientation, planning and training for young women.

1.年轻女性喜欢的职业---
The job young female is glad；

2.年轻女性合适的职业----
The job young female is suitable

3.年轻女性擅长的职业----
The job young female is skillable

4.年轻女性胜任的职业-----
The job young female is qualified

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Shanghai Woman Engineer Association

2.3 Shanghai young generation Female Engineer career value chain

SWEA help young generation female establish positive career values. The goal is ambitious and do solid work; ,

1.职业的成就感 sense of achievement ---- participate in country developing;

2.职业的荣誉感 sense of honor--- professional ranks and technical title;honorary title; award; encourage and reward;

3.职业的自豪感 sense of pride----
career is socially recognized and approve

4.职业的幸福感 sense of happiness--
stable and promising job

5. 个人的满足感 personal satisfaction--
stable income

女工程师协会
Shanghai Woman Engineer Association

2.4 Shanghai young generation Female Engineer career needs

2.4 SWEA created lot of opportunity for young generation Female to improve their career skill：

1.职业的规划要与世界发展接轨----开拓眼界, 参与国际会议,
career planning integrate with world developing---- join international event；

2.职业的长久要身心健康好身体----国家领导人关心年轻女工程师身体健康,
career longness link to physically and mentally healthy--- state leader's takecare；

3.职业的深度要术有专攻-----上海科技节各专业的专题技术讲座
career depth need expertise and technical----professional technical seminars

4.职业的广度要知识面要广----不仅有自己技术专业还跨行学习金融知识
career width require scope of knowledge ----- cross-industry learning each other

5.职业的培训要不断学习提高----上海女性学校定期专家讲课,参观地铁新技术,
career training ask for continuous learning----- Shanghai Female School have regular training from expert , visited the subway new technology

6.职业的传承要前辈传,帮,带下一代----新老三八红旗手接对子,
career inherit senior will be support ----- senior and junior one to one support

7.职业的展示要提供平台----年轻一代女工程师展示多才多艺,
career show need provide platform--- young generation Female show versatile

2.What we done for SH young generation Female Engineer career

1.职业的规划要与世界发展接轨----开拓眼界, 参与国际会议,
Career planning integrate with world developing---- join international event；
The 8th China-Japan-Korea women foram for Science and Technology in 2017.

上海市女工程师协会
Shanghai Woman Engineer Association

2.What we done for SH young generation Female Engineer career

1.职业的规划要与世界发展接轨----开拓眼界, 参与国际会议,

Career planning integrate with world developing---- join international event, 2018 SH Women International Event.





2.What we done for SH young generation Female Engineer career

2.职业的长久要身心健康好身体----国家领导人关心年轻女工程师身体健康,

Career longness link to physically and mentally healthy--- state leader Chairman of All-China Women's Federation Ms. Shen Yue-Yue takecare young felame engineers healthy in 2018.



2.What we done for SH young generation Female Engineer career

3.职业的深度要术有专攻-----上海科技节各专业的专题技术讲座

Career depth need expertise and technical----professional technical seminars in SH Scientific and Technological Festival in 2018.



2.What we done for SH young generation Female Engineer career

4.职业的广度要知识面要广----不仅有自己技术专业还跨行学习金融知识

Career width require scope of knowledge ----- cross-industry learning each other, learning finance and banking knowledge in 2018.





2.What we done for SH young generation Female Engineer career

5.职业的培训要不断学习提高----上海女性学校定期专家讲课,参观地铁新技术,

Career training ask for continuous learning----- Shanghai Female School have regular training from expert, visited the subway company, learning new technology,




2.What we done for SH young generation Female Engineer career

6.职业的传承要前辈传,帮,带下一代----新老三八红旗手接对子,

Career inherit senior will be support ----- senior and junior female engineer one to one support , take care the next generation female,





2.What we done for SH young generation Female Engineer career

7.职业的展示要提供平台----年轻一代女工程师展示多才多艺,

Career show need provide platform--- young generation Female show versatile and diversity performance;





上海市女工程师协会 Shanghai Woman Engineer Association

Contents

1.中国年轻职业女性发展状况
China Young Women Career Development Situation

2.上海女工程师协会为年轻女工程师职业规划所做的工作
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会 Shanghai Woman Engineer Association

3.1The Development history of Shanghai Metro Network

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3.2 Emerging industry--Introduction newest operation situation of Shanghai Metro

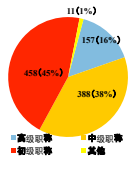
- Operation lines number：19
- Operating line length：705 km
- Operating stations：415 seats;
- railway carriage：4000cargo/

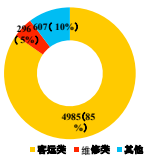
- 2018 totally passenger enter number ：1.9 billion person-times
- 2018 annual passenger flowing：32.5 hundred million times frequency；
- Hightest daily passenger number ：7.2 million (31,December,2018)
- Maximum daily flowing：11.37 million person-times Multip-transportation (31,December,2018)
- **Shanghai Metro planning line number：22 lines（含磁浮线）**
- **Planing line length：1080 km**

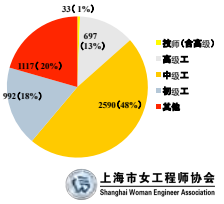
上海市女工程师协会 Shanghai Woman Engineer Association

3.3 Structure of female staff and Workers in Shanghai Metro Group

- The total number of staff and workers is 28989 -----female workers 7289, Female share 25%, Average age of female workers is 32 years-old, very young generation;
- A total 168 middle-level cadres in company management----- female cadres 27, share 16% of total;
- There are 5429 women with professional skills-----There are 1014 young generation female is professionals and technicians job;
- Production workers----There are 5888 young female workers in production lines。







上海市女工程师协会 Shanghai Woman Engineer Association

3.4 Young women's right of professional development

to promote women co-construction

2004年2月，集团女工委组织了22个巾帼班组参加的现场交流检查。各巾帼示范岗（员）按"九个一"的创建要求,规范服务执行，做到技术技能过硬、运营保障措施有力。

Improve job quality and skills

积极组织女职工参加集团技术比武、轨道交通运营劳动竞赛、建设立功竞赛和各类培训，提高工业务知识和技能水平，展示地铁女职工"巾帼不让须眉"的精神。

Build a display platform

集团女工委积极发动、组织女性专业人才参加集团"女性专业人才论文征集评选比赛"。此次活动历时3个月，共征集报送论文60篇,充分展示了轨道交通女性专业人才的风采和技术成果。

协会 Shanghai Woman Engineer Association

3.5 Young women's right for career security

- organization and protection of female workers — －Establishment of female working Committee members by Trade unions of each immediate subordinate Unit
- Effectively protect the legitimate Rights and interests of — -Formulate the Standard of "Special Inspection for female Labor Rights"
- following publicity laws protect females'righ — －following Regulations on Labor Protection of Female Workers, －sign the special collective contract for protecting the female rights 。

3.6 Young women's right for democratic management

- Proportion of female representatives rate in staff congress；
- Investigate the situation of female labor protection；
- Ensure equal treatment for female career promotion；

3.7 Young women's right for career health;

Focus on the work issues in the field	"走100个班组，访1000位职工"活动，深入一线班组了解关心职工需求，帮助解决现场困难。
train female with good culture and stable sentiment	－ 先进女性集体代表和个人的形象礼仪设计讲座 － 创意工坊DIY秀活动、"阳台种菜+厨房酵素"、"职场仪态"、"中医养生和女性保健"等讲座培训 － 维保公司女职工周末学校 － "幸福在美食每刻——巾帼厨艺交流赛"
Care for the physical and mental health of female	－ 周期性女职工体检 － "红粉专列，一路温馨"主题系列活动 － "孕妇粉色候车专区"
Care about single parents.	－ "幸福烘焙"集团公司青年职工联谊交友活动 － "小眼看网络"轨交亲子活动

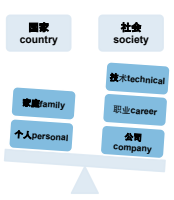
Contents

4.1Balance is gold: Country,Society, Company, Family, Personal

Country, Society, Policy：Men and women get equal, pay for equal job 、National policies care for women

Family,Personal,Children career planning、family planning、Child growth development planning,

Company,Career：Multi-way and diversify to discover the value of young women,give training and learning opportunities,build-up experience,



4.2 Conclusion 1.--young women should be have professionals knowledge and skill

Young women becoming talents----
Career learning, Career planning, Career successful：

1. Equality of men and women;----- An Open, fair and inclusive social environment in Shanghai. Society and companies provide all channels for women to grow their talents,
2. Professionals career lady------ In emerging industry, not only women have jobs but also they do outstanding;
3. Technical career lady ------ most young lady have technology skill，to contribution their intelligence with create economic value for society ;
4. International standards career lady----- more and more capable lady works in Top 50 global international companies, same as men in the daliy work and management;
5. State-level senior career lady----- some excellent young lady into the national leadership,make a contribution to the country's political and policy, become the model for all Chinese women.

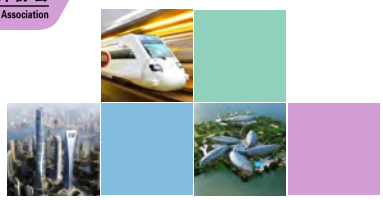
4.3 Conclusion 2.--young women successful balanced various relationships

They succeeded in achieving the following career balance:

平衡国家政策与年轻女性职业保障的关系;
Balance the relationship between national policy and job security for young women;
平衡国家发展需求人才与女性自身优势的关系,
Balancing the relationship between expert and women's own advantages in the country development needs ,
平衡高科技新兴行业与女性个人职业发展关系,
Balance the relationship between new high-tech industries require and women's personal career development,
平衡工作时间与女性婚姻,生育的时间节点,
Balance working hours with women's marriage, birth time nodes,
平衡和成功转换家庭,职场,社会之间不同角色,
Balance and succeed in changing different roles between the family, the career, and society,
平衡女性自身职业成才与培养孩子成才的时间分配,
Balance the time distribution of the female become a talent and the growth of their children,

上海市女工程师协会
Shanghai Woman Engineer Association

上海市女工程师协会
Shanghai Woman Engineer Association



Thank You!

10,October,2019

Q&A

The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Session 3: Role of Chemistry for SDGs

持続社会のための化学の役割

Session 3 Chair (Japan)

Akiko N. ITAKURA
Group Leader, Surface Physics and Characterization Group, National Institute for Materials Science

Education

Degree: BS, Description: of Toho University, Location: Japan, Year: 1986
Degree: PhD, Description: in Sci., Gakushuin University, Location: Japan, Year: 1991

Research Field

Surface and Interface Physics, Vacuum Science, Material Science

Career History

She has been focusing on surface science. First, she had been studied two dimensional phase transition of rare gas films measured by ellipsometry in an ultra-high vacuum. She was a researcher in National Research Institute for Metal (NRIM) from 1991 to 1996 in the field of ultra- to extremely high vacuum. From 1997, she had researched semiconductor materials to investigate surface stress of thin oxide layers on silicon in Reaction & Excitation Dynamics Group. She is currently in National Institute for Material Science (NIMS), Surface Physics and Characterization Group, where she is investigating molecular sensors by using surface stress of a film coated micro cantilevers. And her work around hydrogen visualization is a big topic in the field of materials around hydrogen energy. She has been a visiting professor at Tokyo Medical and Dental University, Yokohama City University, and Charles University (Czech Republic).

Certification

Director of the Vacuum Society of Japan, 2014-2017,
Director of the Physical Society of Japan and a chair of Gender Equality Committee, 2015-1017
Director of the Japan Society of Surface Science, 2015-2017,
Member of Science Council of Japan, 2018-,
Fellow and Director of the Japanese Society of Vacuum and Surface Science, 2018-,
Director of the Society of Japanese Women Scientists, 2019-.

Awards

Best Paper Award, The Surface Science Society of Japan, Appl. 2002
Best Poster Award, Asia-Pacific Surface & Interface Analysis Conference (APSIAC02), Oct. 2002

Achievements

Achievements include academic papers more than 60, management of research group in NIMS, and activities in four academic societies of Japan and so on. As a visiting professor, she taught PhD students in Charles University and under graduate students in Tokyo Medical and Dental University. She has helped five students to get doctoral degrees as a doctoral instructor.

Civic, Political, and Philanthropic Activities

"The Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE)" was established in order to overcome gender gaps in Japan over a long period of time, in 2002. She had supported the activities at the time of its establishment as a committee member. In 2008, she established a gender equality promotion team in NIMS and created a support system for female researchers. In 2015-2017, he was the director of gender equality at the Physical Society of Japan.

Current Memberships

A member of Science Council of Japan, Fellow of the Japanese Society of Vacuum and Surface Science and a vice chair of Gender Equality Committee of the VSS society, Director of the Society of Japanese Women Scientists.

Session 3 Speaker (Japan)

Maki Kawai

Director General, Institute for Molecular Science, Japan
President, Chemical Society of Japan
Member, Science Council of Japan
Professor Emeritus, The University of Tokyo,
Honorary Scientist, RIKEN
Honorary Fellow, Royal Society of Chemistry
Fellow, American Physical Society

Education

Degree: Ph.D., Chemistry, Faculty of Science, The University of Tokyo, Tokyo, Japan 1980

Research Field

Surface Science, Physical Chemistry

Career History

1988-91 TDK Professor, Tokyo Institute of Technology, Yokohama, Japan
1991-10 Chief Scientist, Director of Surface Chemistry Laboratory, RIKEN, Saitama, Japan
2004-17 Professor, Department of Advanced Materials Science, The University of Tokyo, Chiba, Japan
2010-15 Executive Director, RIKEN, Japan
2016 -- Director General, Institute for Molecular Science, National Institute of Natural Sciences, Japan
2018 -- President, Chemical Society of Japan

Certification
Awards

Saruhashi Award, for Woman Scientist, Japan (1996), Japanese Surface Science Society Award, (2005), The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, Prize for Science and Technology (Research Category), Japan (2008), The Chemical Society of Japan (CSJ) Award (2009), American Physical Society (APS) Fellow: (2010), The IUPAC 2015 Distinguished Women in Chemistry / Chemical Engineering (2015), Gerhard Ertl Lecture award, Fritz-Haber Institute der Max Plank Society (2015), Medard W. Welch Award, AVS, U.S.A.(2016), Humboldt Research Award (2017), Medal with Purple Ribbon, Japan (2017), Honorary Fellow, Royal Society of Chemistry (2019),L'Oreal-UNESCO Women in Science (2019)

Achievements

Single molecule spectroscopy utilizing inelastic tunneling process and extracting vibrational spectra from action of molecules (Action Spectroscopy) using STM. Interplay between the localized spin at adsorbed molecule and electrons at the Fermi sea of metal substrate is another topic where Zeeman splitting or the Kondo resonance are resolved in sub-atomic resolution in space.

Civic, Political, and Philanthropic Activities

Mem. Chemical Society of Japan, Surface Science Society of Japan, The Physical Society of Japan, The Japanese Society of Applied Physics, Catalysis Society of Japan, American Physical Society, American Chemical Society, AVS,

CSJ committing to SDGs

Maki **KAWAI** [1, 2]

(1. Director General, Institute for Molecular Science, Myodaiji, Okazaki 444-8585, Japan,
2. President, Chemical Society of Japan, 1-5, Kanda-Surugadai, Chiyoda-ku, Tokyo 101-8307, Japan.
E-mail maki@ims.ac.jp)

Abstract: Brief introduction to activity of Chemical Society of Japan towards Sustainable Development Goals will be given.

Keywords: SDG's, CSJ,

Introduction to Chemical Society of Japan [1]

The Chemical Society of Japan (CSJ), initially named the Chemical Society, was founded in 1878 by approximately twenty motivated and enthusiastic young scholars wishing to advance research in chemistry. Later, it was renamed The Tokyo Chemical Society, and eventually given the present English name of "The Chemical Society of Japan."

In 1948, it merged with the Society of Chemical Industry, founded in 1898. Thus the CSJ has a history encompassing 140 years, with a current membership exceeding 27,000, and is one of the most affluent academic societies in Japan, covering most areas of pure and applied chemistry.

It has contributed and circulated the results of chemical research to chemists and industry throughout the world. The prime mission of the CSJ is to promote chemistry for science and industry in collaboration with other domestic and global societies. Above all, the overriding purpose of the Society is to contribute to the betterment of human life.

To pursue these missions, the Society holds various academic conferences, lecture meetings and publishes journals and books. Today, the world shares common pressing issues, interests relating to energy, food, environmental problems, safety, human health and education, which require a rapid exchange of information in every field of research with other countries.

The CSJ has a long history in chemical education and in its outreach program to the public. These activities have recently been redoubled to heighten public awareness, and to stress the importance of chemistry's role in solving the many problems besetting people and the environment today.

REFERENCES

[1] http://www.chemistry.or.jp/en/

Happy People Doing Science

女性研究者を紹介した本
記事は学生によるインタビュー
韓国で出版(2006)
ベストセラーになった

何故か Kawai も紹介された

Produced by APCTP

The Chemical Society of Japan

SDGs : Activity of CSJ

The Chemical Society of Japan

Maki Kawai

President , The Chemical Society of Japan
Director General, Institute for Molecular Science

SEC member, IBS Korea
Science Advisory Board member,
Quantum NanoScience Research Center, Ewha Womans University, Korea

Akira Yoshino received the 2019 Nobel Prize in Chemistry

- Dr. Akira Yoshino (Asahi Kasei Fellow and Honorary Member of the Chemical Society of Japan) received the Nobel Prize in Chemistry 2019.
- Dr. Yoshino shared the prize with two other researchers for the development of lithium-ion batteries. The co-winners are Dr. John Goodenough of the University of Texas, and Dr. M. Stanley Whittingham of Binghamton University, State University of New York.

Congratulations!

Press conference Oct 10th, 2019 @ CSJ

Contents

Mission and History

Mission

Our goal is to contribute to the development of society through the advancement of research and learning, development of technology, promotion of industry, spread of knowledge, and education of those supporting these endeavors.

History

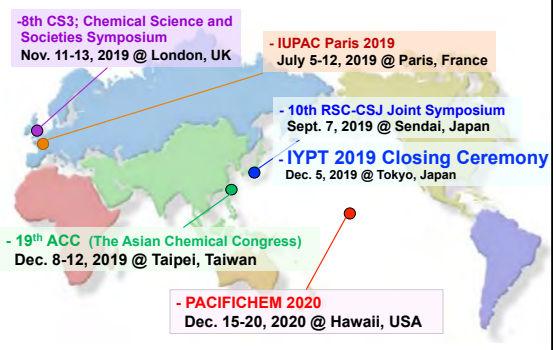
1878	The Chemical Society founded, renamed the Tokyo Chemical Society the following year
1898	The Society of Chemical Industry of Japan established
1921	The Tokyo Chemical Society renamed the Chemical Society of Japan
1948	Integration with the Chemical Society of Japan and The Society of Chemical Industry of Japan, The Chemical Society of Japan (CSJ) launched
1991	The current office building completed
2011	Public Interest Incorporated Association authorized
2018	The 140th anniversary celebrated

The Chemical Society of Japan

Topics

International Relations

International Collaborations



The Chemical Society of Japan

Approach for SDGs

- About CSJ
- Topics
  - International Relations
  - Journal Publication
- Approach for SDGs
- Activities for Gender Equality

The Chemical Society of Japan

Approach for SDGs in Japan

◇**Recognition of current situation**
(from SDG Index and Dashboards Report 2018)
・Japan ranks 15th/156 countries
・High rating in the following items
Goal4 (Quality Education)
・Low rating in the following items
Goal5 (Gender equality)
Goal12 (Responsible consumption and production)
Goal13 (Climate action)
Goal14 (Life Below Water)
Goal17 (Partnerships for the goals)

◇The efforts in Japan
・Government Ministry of Education, Culture Sports, Science and Technology (MEXT)
April 2018 : Basic Policy on Promotion of Science, Technology and Innovation for SDG s (STI for SDGs)
・ Private enterprises (ex: Sumitomo Chemicals)

◇So, in the chemical society?

The 2018 Global SDG Index ranking and scores

Rank	Country	Score
1	Sweden	85.0
2	Denmark	84.6
3	Finland	83.0
4	Germany	82.3
5	France	81.2
6	Norway	81.2
7	Switzerland	80.1
8	Slovenia	80.0
9	Austria	80.0
10	Iceland	79.7
11	Netherlands	79.5
12	Belgium	79.0
13	Czech Republic	78.7
14	United Kingdom	78.7
15	Japan	78.5
16	Estonia	78.3
17	New Zealand	77.9
18	Ireland	77.5
19	Korea, Rep.	77.4
20	Canada	76.8

SDG Index and Dashboards Report 2018.

SDG Dashboard for OECD countries

SDG Index and Dashboards Report 2018.

SDG Dashboard : Country Profiles for Japan

The Chemical Society of Japan — Approach for SDGs in Japan

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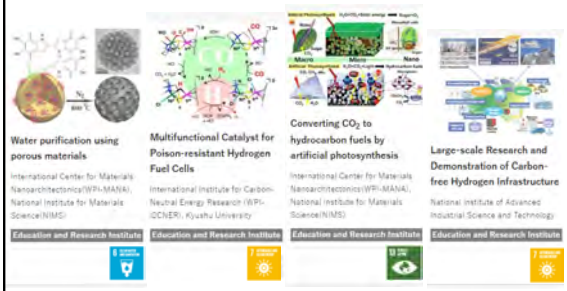
◇So, in the chemical society?

Science, Technology and Innovation (STI) for implementing the SDGs

Practice in Japan from HP of JST*

(*Japan Science and Technology Agency)



Science, Technology and Innovation (STI) for implementing the SDGs

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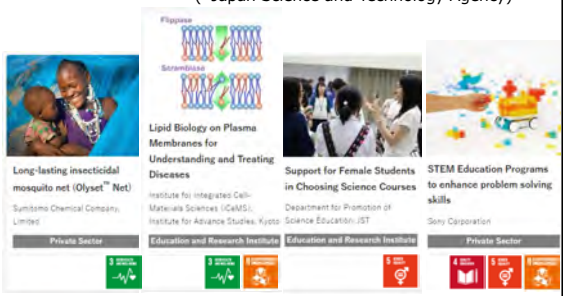

Sustainability Highlights 2018 — SUMITOMO CHEMICAL

Management for Sustainability

In order to encourage each employee to put into action the philosophy of "contributing to society through our business," we work to have all employees participate (P: Participation) in efforts to provide solutions (S: Solutions) through business and help achieve the SDGs, and all our top executives (T: Top) are committed to the initiatives.

Sustainability Highlights 2018 — SUMITOMO CHEMICAL

What Are the SDGs?—A Manga in 11 Languages

名古屋大学 NAGOYA UNIVERSITY　ITbM Nagoya University　wpi

Itami research group (Nagoya Univ.) identified the protein responsible for germination of Striga seeds

"Green light of hope to overcome Striga-triggered food insecurity in Africa ～ Fluorescent turn-on probe identifies the 'wake-up protein' in witchweed seeds～"
http://www.itbm.nagoya-u.ac.jp/en/research/2015/08/Yoshimulactone-Striga.php

The Chemical Society of Japan — Approach for SDGs in Japan

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・Private enterprises (ex: Sumitomo Chemicals)

◇So, in the chemical society?

The Chemical Society of Japan — Efforts in CSJ for SDGs

- **Delivering the messages to CSJ members**
  - Membership Magazine "Chemistry and Chemical Industry"
    -Preface
    Dec. 2018 "SDGs, Diversity and Inclusion"
    by Reiko Kuroda (Tokyo University of Science)
    -Editorial
    Jan. 2017 by Tateo ARIMOTO
    (The National Graduate Institute for Policy Studies：GRIPS)
    Feb. 2018 by Hisao URATA (Mitsubishi Chemical)
    Nov. 2018, Jan. 2019 by Tateo ARIMOTO (GRIPS)
- **Symposium, Meeting**
  - Spring Annual Meeting
    2018 "A New Start of Your Research toward Chemistry-Driven SDGs! "
    2019 " Sustainable and Functional Redox Chemistry Contributing to SDGs"
  - Collaboration with other society
    Nov. 2018 with Japan Union of Chemical Science and Technology
    Feb. 2018 with The National Institute of Advanced Industrial Science and Technology (AIST) and more・・・

The Chemical Society of Japan — CSJ Efforts for SDGs

GOAL4 Quality Education, Lifelong Learning

➢ Activities for Education & Promotion
◇International Chemistry Olympiad (IChO)
◇Chemistry Grand Prix

50th International Chemistry Olympiad in Slovakia and Czech Republic (2018)

◇Experiment Education for Children

Chemistry day (October 24) classroom

Classroom for Junior high school students

The Chemical Society of Japan — CSJ Efforts for SDGs

GOAL 6 Water and Sanitation

➢ Discussion at CS3

Times	Year	Place	Theme
6	2015	Leipzig/DE	Chemistry and Water

GOAL 7 Reliable, Sustainable and Modern energy

➢ Discussion at CS3

Times	Year	Place	Theme
1	2009	Kloster Seeon/DE	Sunlight to Power the World
2	2010	London/GB	Sustainable Materials
4	2012	Sun Francisco/US	Chemistry for Next-Generation Sustainable Electronics
5	2013	Narita/JP	Efficient Utilization of Elements
7	2017	Dalian/CN	Solar Energy & Photonics for a Sustainable Future

The Chemical Society of Japan — CSJ Efforts for SDGs

GOAL 7 Reliable, Sustainable and Modern energy

➢ Discussion at CS3

Research grant" Akira Yoshino grant"
for Basic research on lithium ion batteries
≃20K USD
This grant was founded in 2014 with the donation of Akira Yoshino, an honorary member of the Chemical Society.

The Chemical Society of Japan — CSJ Efforts for SDGs

GOAL 14 Oceans, Seas and Marine Resources

- Discussion at CS3

Times	Year	Place	Theme
8	2019	London/GB	Plastics

2019 CS3: Plastics
Chair person: Professor Charlotte Williams, University of Oxford
Sub-topics:
(1)New types of plastics
(2)Degradation
(3)Recyclability
(4)Measuring the impact of plastics?

The Chemical Society of Japan — The Chemical Sciences and Societies Summit (CS3)

The CS3 brings together leading researchers to discuss how the chemical sciences can help to tackle some of the most daunting challenges that our world faces. Previous summits have tackled topics as diverse as water resources, human health, and sustainability.

Country	Collaboration between	Supported by
China	Chinese Chemical Society (CCS)	The National Science Foundation of China (NSFC)
Germany	German Chemical Society (GDCh)	German Research Foundation (DFG)
UK	Royal Society of Chemistry (RSC)	UK Engineering and Physical Sciences Research Council (EPSRC)
USA	American Chemical Society (ACS)	U.S. National Science Foundation (NSF)
Japan	Chemical Society of Japan (CSJ)	Japan Society for the Promotion of Science (JSPS)

The Chemical Society of Japan — The Chemical Sciences and Society Summit (CS3)

Times	Year	Place	Theme
1	2009	Kloster Seeon/DE	Sunlight to Power the World
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3	2011	Beijing/CN	Chemistry for Better Health
4	2012	Sun Francisco/US	Chemistry for Next-Generation Sustainable Electronics
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The Chemical Society of Japan — Approach for SDGs in Japan

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Goal14 (Life Below Water)
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◇The efforts in Japan
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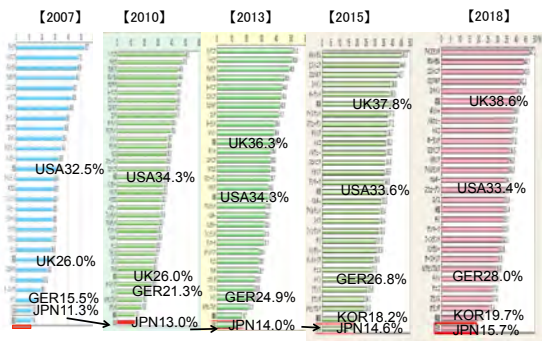
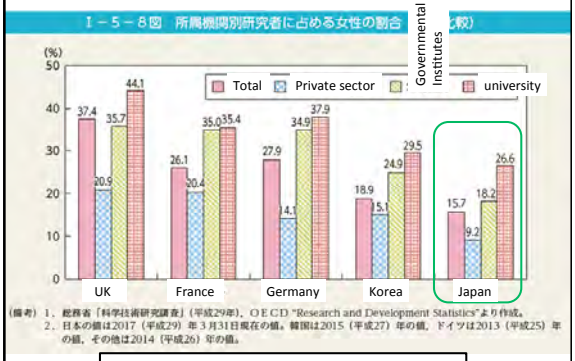
April 2018 : Basic Policy on Promotion of Science, Technology and Innovation for SDGs (STI for SDGs)
・Private enterprises (ex: Sumitomo Chemicals)

◇So, in the chemical society?

The Chemical Society of Japan — Ratio of Female Researchers (OECD Countries)



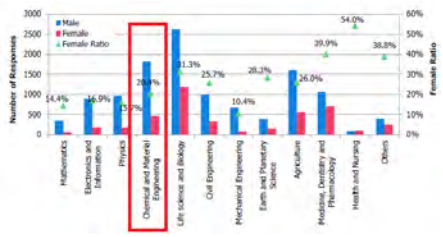
(White Paper on Gender Equality 2019, Gender Equality Bureau Cabinet Office)



Further effort necessary for the private sector

The Chemical Society of Japan

Breakdown of Respondents by Profession



Japanese research personal
(4th Large Scale Survay (2017), 19p, EPMEWSE)

The Chemical Society of Japan

CSJ Efforts for Gender Equality

GOAL5 Gender Equality

➢ Activities by Gender Equality Committee

CSJ Gender Equality Committee (GEC)

- Make a real gender equivalent society in the field of chemical science and engineering
- Established in 2002
- Member: 12
- Activities:
  - ➢Symposia
  - ➢EPMEWSE
  - ➢Events
  - ➢The CSJ Award for Women Chemists

The Chemical Society of Japan

CSJ Efforts for Gender Equality

GOAL5 Gender Equality

➢ Activities by Gender Equality Committee

Summer School

- Held annually
- For female junior and senior high school students
- Career Consultation
- Chemical Experiment

Seminar for female students

- Job-hunting seminar
- Held annually
- For undergraduate and master students

The Chemical Society of Japan

CSJ Efforts for Gender Equality

GOAL5 Gender Equality

➢ Activities by Gender Equality Committee

Gender Equality Symposium

- Held annually
- "Activities of women and men for a society of great diversity"
  (March 18, 2019)

EPMEWSE

- One of the three founding societies of EPMEWSE
- Cooperation to Large-Scale Surveys on Gender Equality in STEM
- Core society of science course choice project for women's junior and high school students

The Chemical Society of Japan

CSJ Efforts for Gender Equality

GOAL5 Gender Equality

➢ Activities by Gender Equality Committee

Action Plan (2003)

Goals：
✓ Ratio of board and committee members: 20%
✓ Establish an award for female researchers

2019

- ✓ Must include at lease one female board member (3 as of 2019)
- ✓ First female president: Prof. Maki Kawai (2018-)
- ✓ First female vice president: Prof. Masako Kato (2019-)
- ✓ The CSJ Award for Women Chemists established (2012-)

Session 3 Speaker (Korea)

Heesun CHUNG

Professor, Dean, Graduate School of Analytical Science and Technology, Chungnam National University, South Korea

Education

Degree: BS, Pharmacy, Sookmyung Women's University, Korea, 1978

Degree: MS, Pharmacy, Sookmyung Women's University, Korea, 1980

Degree: PhD, Pharmacy, Sookmyung Women's University, Korea, 1987

Research Field

Drug testing in biological fluids (Urine, hair, blood, oral fluids)

Forensic Toxicology

Determination of biomarker for the postmortem interval

Career History

2013- present professor, dean, graduate school of analytical science and technology, Chungnam National University

2010 - 2012 Director General (Grade 1) National Forensic Service

2008 - 2010 Director General (Grade 2) National Institute of Scientific Investigation

2002 - 2008 Head, Department of Forensic Science, National Institute of Scientific Investigation

1996 - 2002 Director, Narcotics Analysis Division, National Institute of Scientific Investigation

1993 - 1996 Director, Drug-Toxicology Division, National Institute of Scientific Investigation

1990 - 1991 Postdoctoral course, King's College London, UK

Appointments

2019 President-elect, Korea Federation of Women's Science & Technology Associations

2019 Advisory committee member , National Police Agency

2018 Committee member, Bioethics appointed by the president

2016 Committee member , DNA Management committee by Prime minister

2011 - 2014 President, The International Association of Forensic Sciences

2014 - 2017 President, The International Association of Forensic Toxicologists

Awards

2014 Honorary Commander of the Most Excellent Order of the British Empire (CBE)
2012 Medal for the Distinguished Service (Korean Government)
2010 Bichumi Woman Award (Samsung Life Insurance Company)
2009 Medal of Mongolian Government (Ministry of Home Affairs and Justice)
2007 Year of Woman Scientist (The Ministry of Science and Technology)

Current Memberships

Board member: The International Association of Forensic Toxicologists

Member, Korean Association of Forensic Sciences

Editorial board, Forensic Science International

Editorial board, Forensic Toxicology

Role of Chemistry for Sustainable Development Goals

Heesun Chung, CBE, Ph,D

(Graduate School of analytical Science and Technology, Chungnam National University, 99 Daehak-ro, Yuseong-gu, Daejeon, Korea, hschung@cnu.ac.kr)

Abstract: T United Nations provided a shared blueprint of peace and prosperity for people and the planet in 2015 and set the 17 Sustainable Development Goals (SDGs). Among 17 goals, there are goals which need the support from Chemistry such as Peace, justice and strong institutions as well as sustainable cities and communities. In this talk, the role chemistry in justice and peace will be addressed by introducing Forensic chemistry, especially forensic toxicology.

By using all different and state of art technology, poisons and chemical substances are identified in biological fluids of deaths or living people for determining the cause of deaths or the trends of harmful and abused drugs in society or effect of drugs on human being.

The role of forensic toxicology for justice will be discussed by the definition of poisons, and the gender difference in drug related deaths and drug use.

Recently there are so many drug related deaths worldwide, mostly opioid-related deaths. It is very important to note that women are more likely to use prescription opioids compared to men, because women have a greater sensitivity to pain than men. So, there is a possibility for women to begin the misuse of opioids through medical treatment and increase the likelihood of an overdose.

The gender difference in drug related deaths will be showed by statistics and data from literatures and articles. The deaths from opioids will be discussed along with the abuse of Zolpidem which is the most commonly detected drug in emergency room as well as in acute intoxication cases.

1 INTRODUCTION

Sustainable Development Goals (SDGs) by United Nations needs action from both developed and developing countries with a global partnership. Among 17 goals there are goals which need the role of chemistry to achieve goals such as Climate action, Life below water and life on land. In addition to these, Chemistry also plays important role in Peace, justice and strong institutions as well as sustainable cities and communities.

In this talk the role of forensic chemistry in Justice and Safety will be addressed by introducing Forensic Science. Society with Peace and Justice is where we dream to live and a society where there is no threat from crime and drugs is the one we want to live. To build a society free from drugs and crimes, forensic chemistry as a part of chemistry plays a pivotal role to support the crime investigation as well as the justice system by identifying the physical evidences collected from crime scene.

Forensic science is the application of science to criminal and civil laws in the criminal investigation, as governed by the legal standards of admissible evidence and criminal procedure. There are many disciplines of Forensic science such as anthropology, criminalistics, digital sciences, Engineering sciences, odontology, pathology, biology, behavioral science, questioned documents and forensic chemistry.

In forensic chemistry, there are also many sub-divisions of drugs of abuse, toxicology, alcohol, explosives, polymers and many more. Among these sub-divisions, toxicology is the one to be discussed mainly in this talk.

Forensic toxicology is the science that deals with medical and legal aspects of the harmful effects of the chemicals, toxic substances or poisons on the human body. Forensic toxicology divided into five major sub-divisions' death investigation (post-mortem), human performance, workplace drug testing, doping control, and drug-facilitated crimes The trend of increasing crimes and deaths related to drugs and other toxic materials, as well as drug abuse and misuse, makes forensic toxicology essential in peace of society. By examining the nature and extent of chemical involvement in a potential human poisoning, it plays pivotal role in determining the cause of death.

2 DRUG RELATED DEATHS IN CHEMISTRY

To begin with, the definition of poison is given based on Paracelsus's theory. He said, "All substances are poisons; there is none which is not a poison. The right dose differentiates a poison and a remedy." It means that the only difference between a poison and a remedy is the amount. Poisons are generally defined as chemicals that damage health and destroy life itself.

To explain the meaning of poisons easily, the books by Agatha Christine will be introduced. She wrote 80 books and killed 300 people in her books. Among them 100 was killed by 30 different of poisons. She used many plant poisons, chemicals as well as something novel to kill people. There was a very interesting story regarding her knowledge of poisons. In 1976, 19 - month old baby came to London from Iraq for the treatment of mysterious symptoms such as lethargy, numbness, black-outs, slurred speech, general debility. When a nurse saw her symptoms, she remembered the book "Pale horse" by Agatha Christie, in which victim's symptoms were exactly same as what a baby showed. So she asked a doctor to test the presence of Thallium in the baby's biological specimens. Surprisingly Thallium was positive and the baby was cured by a proper treatment. This story shows how knowledgeable Agatha Christie was in description of poisons in her books. This story was published in the British journal

In order to determine the cause of death, especially by poisons, forensic toxicologists must analyze the biological fluids from the deceased to identify poisons. Recently there are so many drug related deaths worldwide. UNODC reported that there were a minimum of 190,000 drug related deaths worldwide in 2015, mostly opioid-related deaths. The largest numbers of deaths were in Asia followed by America. However, North America had the highest drug-related mortality rate, followed by Oceania. The highest rate for a country was 245 per 1 million people in the US, followed by Iceland and El Salvador. In 2016, 63,632 drug-related deaths were reported in the US and of these 42,249 cases involved opioids. The number of deaths due to synthetic opioids increased sharply since 2014, as well as the number of deaths due to semi-synthetic opioids and heroin. This was because synthetic opioids were sold as or mixed with semi-synthetic opioids and heroin. Of the opioid-related deaths, 46% were linked to synthetic opioids, while of the heroin-related deaths, 37% were linked to synthetic opioids. Many fentanyl-related deaths have been recorded due to their variable purity and potency. The report of NIH showed that deaths due to the synthetic opioids in the US reached over 70,000 now. It is very important to note that women are more likely to use prescription opioids compared to men, because women have a greater sensitivity to pain than men. So, there are possibility for women to begin the misuse of opioids through medical treatment and increase the likelihood of an overdose.

Unfortunately, overdoses related to opioids have greatly increased in women compared to men. Furthermore, women develop a dependence on opioids faster than men due to a heightened dopamine response in the brain.

Between 1999 and 2016, overdose deaths from opioid prescriptions increased by 404% for men and 583% for women. In 2016, 27 men died per day from prescription opioid overdose, compared to 19 women per day. Conversely, the rate of opioid-related deaths among women climbed 596% between 1999 and 2016 (deaths among men increased 312%).

In addition, women exposed to an addictive substance develop a drug use disorder more rapidly than men. Men are more likely than women to use almost all types of illicit drugs, and illicit drug use is more likely to result in emergency department visits or overdose deaths for men than for women. Drugs associated with homicide (marijuana, cocaine and amphetamines) are stronger among males, while drugs associated with suicide are stronger among females (antidepressants and opiates)

The data accumulated by toxicologists are very important to predict the trends of drug overdose as well as to maintain a healthy society.

3 ZOLPIDEM RELATED CASES

Zolpidem is the most prescribed sedative-hypnotic and a non-benzodiazepine hypnotic agent which has been shown to be effective in inducing and maintaining sleep in adults. It is very important to note that the Food and Drug Administration (FDA) in US claimed the existence of new data showing women to be at risk for excessive daytime sedation and impaired driving proficiency following bedtime doses of zolpidem. Also zolpidem clearance is lower in females than in males indicating there is a big gender difference in the effect of the drug. Zolpidem has been marketed in Europe since 1987, and was approved by US Food and Drug Administration (FDA) in April 1992. It is the 15th most prescribed drug in the US and as a result, a

high number of acute intoxication has been reported and the most commonly detected drug in emergency room worldwide. In accordance with the tension and/or temptation from rapid changes in society, intoxication of drugs is significantly increasing year by year and there are so many patients admitted in emergency room due to the drug overdose.
In Korea, zolpidem was detected in many autopsy cases conducted by National Forensic Service and used for suicide attempt due to acute intoxication. Also zolpidem was the most frequently detected drug in emergency room. By using a fast and accurate screening method to identify zolpidem in biological fluids, the blood concentration of zolpidem was measured to determine the cause of death and prevalence and harm of Zolpidem in society.

4 CONCLUSION

In conclusion, Forensic toxicology as a part of chemistry plays an important role for identifying chemicals and substances in biological fluids for the cause of deaths and trends of drug related deaths. By identification of drugs and substances, it provides information of gender differences in drug related deaths which is very important to prevent misuse and treat pain. Because women and men experience different paths and different treatment needs, it is important to understand the gender differences in drug use, risks and harms. Over all, chemistry is a very important supporter for keeping peace and safety of society to achieve Sustainable Development Goals

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Hello, Tokyo!

6th meeting in China 2014

Wonderful time in China 2014

Wonderful time in China 2014

Role of Chemistry for SDGs

Heesun Chung , GRAST

Chungnam National University, Daejeon, Korea

Sustainable Development Goals

Chemistry for SDGs

Chemistry for SDGs

Chemistry for SDGs

What Chemistry for Justice?

Justice

Forensic Science

Forensic Chemistry

1978 Forensic Life Began!

Seoul, South Korea

30 Years Later

NFS 11th Director General

Life in Forensic Science
IAFS president (2011-2014)

TIAFT President (2014 – 2017)

T I A F T
The International Association of Forensic Toxicologists

Agenda

- Role of forensic toxicology in Justice
  - poison
  - Hair drug testing
- Gender differences in drug related deaths and drug abuse

What is Forensic Toxicology?

Forensic toxicology

(*American Board of Forensic Toxicologists*)

The science that deals with medical and legal aspects of the harmful effects of the chemicals, toxic substances or poisons on the human body.

Who is this woman?

Agatha Christie

80 books

300 people killed

100 poisoned

30 poisons

Poisons used by Agatha Christie?

What was her favorite poison?

Cyanide it kills quickly

200-300mg Potassium cyanide is lethal

How did she administer cyanide?

Added to Champagne

Hypodermic injection to the neck

Inhaled through atomizer

Thallium

In 1976,
19-month-old girl

Nurse recognized
Mysterious symptoms

Requested Dr. to
test for tallium

lethargy, numbness, black-outs, slurred speech, general debility

Published in the
British Journal

How did she learn?

WWI Nurse

Pharmacy Exam

Self-study

Is she a real expert?

Give me a decent bottle of poison and I'll construct the perfect crime

Five Divisions

Postmortem Toxicology

Forensic Workplace Drug Testing

Human Performance Toxicology

Drug Facilitated Crime

Doping Control

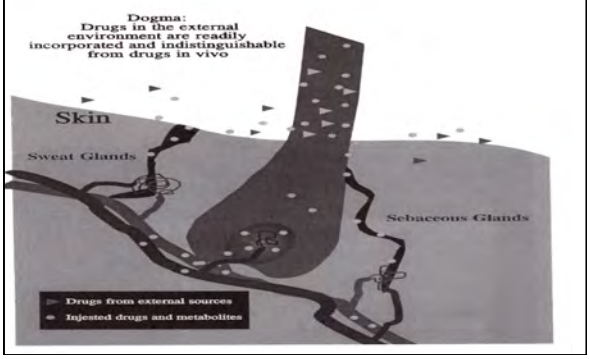
High-profile case in 2019

- **K-pop singer and actor was suspected for taking methamphetamine**
- **He denied to take any drug**
- **He tried to destroy evidence by dyeing and shaving of the hair from all his body before undergoing the drug test**

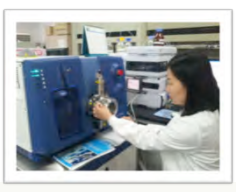
High-profile case in 2019

- **Police collected hair sample from his leg.**
- **National Forensic Service conducted a drug test and the result was positive for methamphetamine**
- **Later he confessed to take it.**

Hair analysis for drugs



Hair analysis



Ensures Justice for All

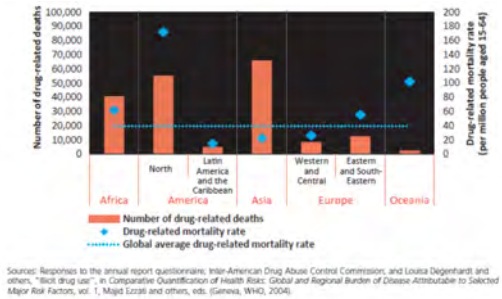
Gender and drugs

A Minimum of 190,000 Drug Related Deaths

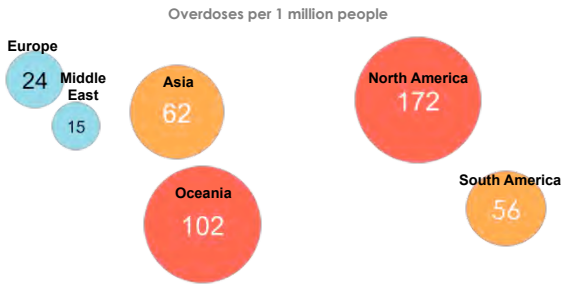
Mostly opioid related overdoses

UNODC 2015

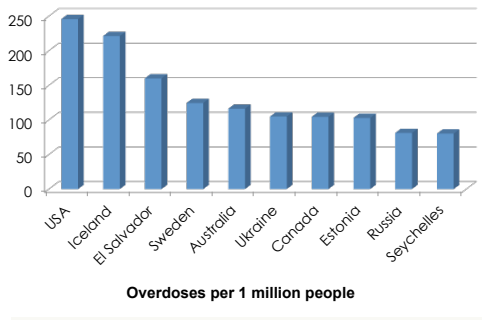
Regional variation in drug-related deaths



The regional drug related mortality rate in 2015

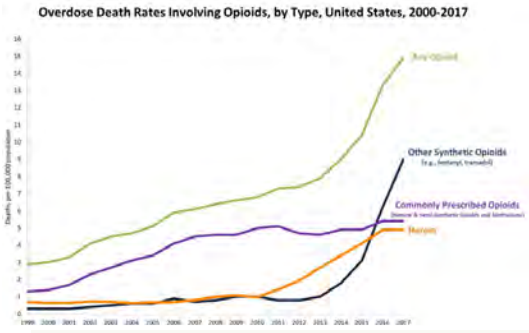


Drug related death rates in countries



Overdoses per 1 million people

Drug related death in the US



What are synthetic opioids?

Opioids Classification

Natural opium alkaloids	Morphine	Codeine
Semi synthetic	Heroin	Buprenorphine
Synthetic opioids	Methadone	Fentanyl

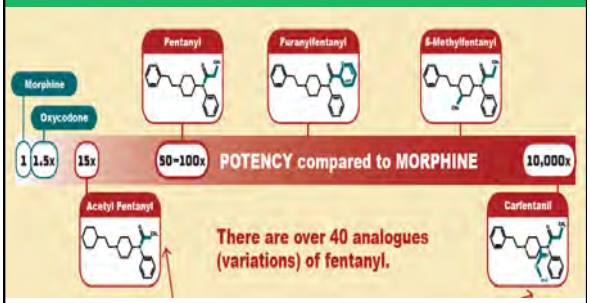
What is Fentanyl?

A family of synthetic opioids

Some are incredibly strong

Effective at very small doses and difficult to detect

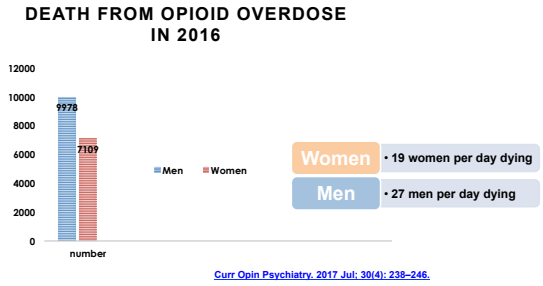
How powerful are Fentanyl Analogues?



safemedicines.org

Is there any gender difference in opioid use?

Deaths by prescription opioid o verdose

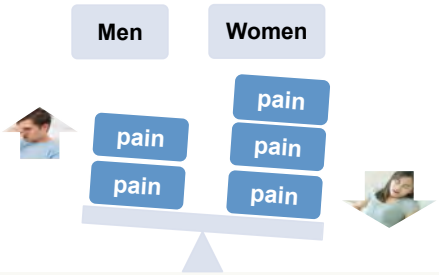


Curr Opin Psychiatry. 2017 Jul; 30(4): 238–246.

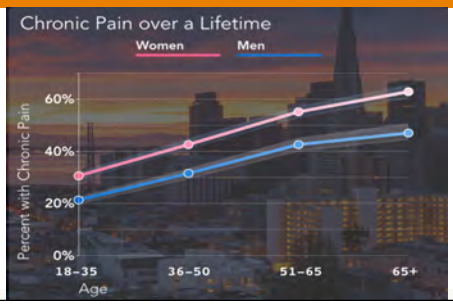
Opioid overdoses increased more rapidly for women

Why women use opioids more?

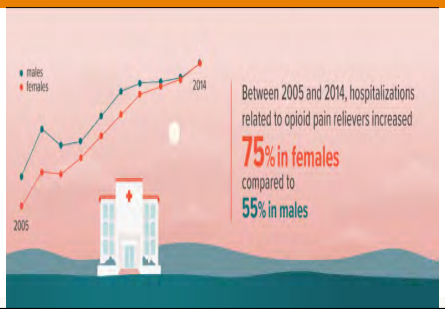
Women are more sensitive to pain than men



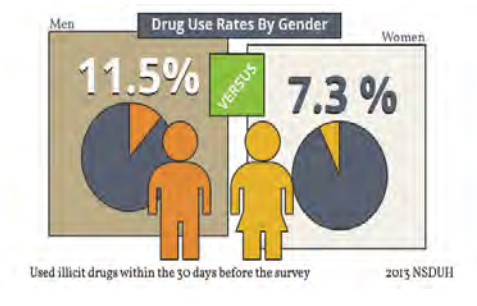
Women are more likely to have chronic pain



Women are more likely to use prescription opioids compared to men



Drug use rates by gender

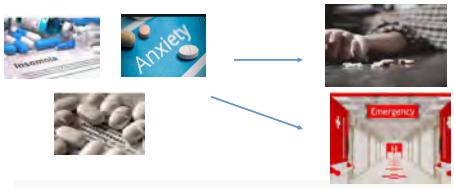


Gender differences in drug use

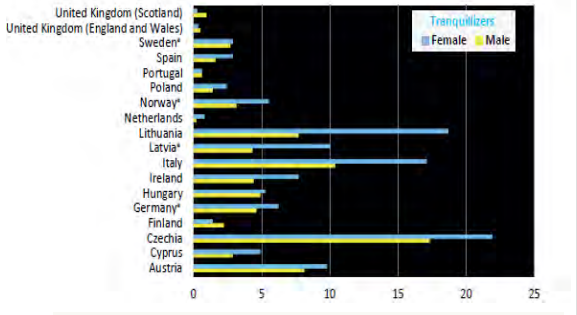
- Men are more likely than women to use cannabis, cocaine and opiates,
- the prevalence of the non-medical use of opioids and tranquillizers , antidepressant and anti-anxiety

Antidepressants and anti-anxiety or sleep drugs

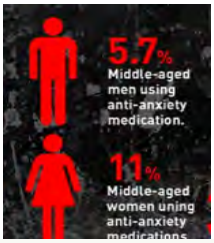
- **Women are more likely to die from overdoses involving medications for mental health conditions, like antidepressants.**
- **Antidepressants and anti-anxiety or sleep drugs send more women to emergency departments than men .**



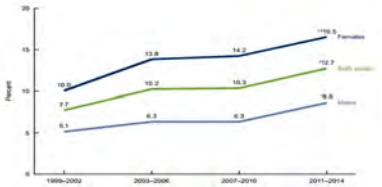
Annual prevalence of tranquillizers among those aged 15–64, 2011-2016 in Europe



Anti-anxiety medications or sleeping aids



Use of Antidepressants



Centers for Disease Control and Prevention

- **Antidepressant use has increased**
- **Women are more than twice as likely to use the drug as their male counterparts**

Why women are more at risk than men for anxiety and insomnia?

Women are being prescribed mor e of these types of medications

Greater access can increase the risk of misuse

Lead to substance use disorder or overdose

Consequences of Drug use by Women

- **Women often suffer more than men with serious long-term consequences**
- **Women may be more susceptible to craving, relapse, which are key phases of the addiction cycle.**
- **Women are just as likely as men to develop a substance use disorder.**

What are problems on women and drugs?

- Women seek help for substance abuse at much lower rates than men
  - 33 percent of the individuals admitted for treatment in 2011 were female, while 67 percent were male
- It also reflects a reluctance among women to admit the need for help or to believe that they deserve recovery services.
- Women may also refuse treatment because of childcare responsibilities,
  - a lack of financial resources to pay for treatment,
  - a lack of adequate transportation.

Women and Drug in SDGs

- ensuring healthy lives and promoting well-being at all ages
- achieving gender equality and empowering all women and girls
- promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- reducing inequality within and among countries
- promoting peaceful and inclusive societies for sustainable development

Conclusion

- Understanding gender differences related to Drug abuse and deaths
- Differences in drug use by gender can result in differential consequences that matter such as serious morbidity and mortality
- For women
  - Building self-esteem
  - Setting boundaries with partners and children
  - Managing stress
  - Improving communication skills

Do you know where?

2021

The 10th Korea-China-Japan Women Leaders Forum For Science & Technology

The Benefits of the meeting

Opportunity to Give

Transfer Knowledge

Lift up Others

See you in Seoul 2021
Thank you very much

Session 2 Speaker (China)

Zhimin LIU
Professor, Institute of Chemistry (IC), Chinese Academy of Sciences (CAS)

Education

Degree: BS, Description: in Chemical Engineering, School: Qingdao University of Science and Technology, Location: Qingdao, Shandong, China, Year: 1990
Degree: Master, Description: in Chemical Engineering, School: Qingdao University of Science and Technology, Location: Qingdao, Shandong, China, Year: 1993
Degree: PhD, Description: in Chemical Engineering, School: China Petroleum University, Location: Beijing, China, Year: 1997

Research Field

Green chemistry, Utilization of CO_2, Chemical transformation of biomass to chemicals, fuels and materials, Ionic liquids

Career History

Zhimin Liu is a professor and a group leader of CAS Key Laboratory of Colloid Interface and Thermodynamics, ICCAS, China.
After she received Ph.D in 1997, she worked as a postdoc in ICCAS for 2 years, and was hired as an associate professor by ICCAS in 1999. She visited Nottingham University (UK) and Tohoku University (Japan) as a visiting scientist in 2003 and 2006, respectively. Since 2007, she has been working as a full professor in ICCAS. Her research interest is green chemistry with focus on green solvents and chemical conversion of CO_2 and biomass.

Awards and Scholars

- China National Natural Science Foundation for Distinguished Young Scholars in 2011
- The Second Prize of the National Science and Technology Progress Award in 2011 (Rank No. 2)
- Leading Talent in Science and Technological Innovation of Ministry of Science and Technology in 2016
- Leading Talent of National High-Level Personnel of Special Support Program in 2018.

Current Memberships

- Vice Chairman of *Committee on Supercritical Fluid Technology of Chemical Industry and Engineering Society of China*
- Member of *Committee on Ionic Liquids of Chemical Industry and Engineering Society of China*
- Member of *Committee on Green Chemistry of Chinese Chemical Society*
- Member of *Committee on Chemical Thermodynamics and Thermal Analysis of Chinese Chemical Society*
- General Secretary of *Supercritical Fluid Association of Asia*
- Editor-in-Chief of *Current Opinion in Green and Sustainable Chemistry*
- Editorial board member of *Sustainable Chemistry and Pharmacy*
- Editorial Advisory Board of *Industrial & Engineering Chemistry Research*
- Editorial board member of *Chinese Science Bulletin*
- Editorial board member of *Acta Physico-Chimica Sinica*

GREEN CHEMISTRY PROMOTES SUSTAINABLE DEVELOPMENT

ZHIMIN LIU

Institute of Chemistry, Chinese Academy of Sciences, China. liuzm@iccas.ac.cn

Abstract: Sustainable development is one of the most important issues for our society and is a great challenge. Green chemistry, which is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances, will promote the sustainable development of our society. Herein, the important aspects of green chemistry including atom economic reaction, green catalysis, green solvent, green carbon science and green product are introduced, which may provide solutions to achieve the sustainable development goals.

Keywords: green chemistry, atom economic reaction, green solvent, green catalysis, green carbon science, green product, education

1. Introduction

Chemistry is a central science that creates new materials and deals with the composition, structure, and properties of substances and with their transformations. Chemistry has greatly contributed to modern civilization, which provides about 97% products in the world and makes our lives better. For example, the invention of ammonia and related fertilizers renders the production of enough foods to meet needs of people all over the world. The medicines protect the health of people, and lengthen their average life span. Man-made materials make the world colorful and wonderful. However, we have to admit that chemistry also has polluted our planet and depleted natural resources greatly, so the sustainable development of our society is confronted with great challenges.

Green chemistry, which is the design of chemical products and processes that reduce or eliminate the use or generation of hazardous substances [1], guides the development directions of chemistry using the well−known “Twelve Principles”. The core of green chemistry is to save resources and energy, convert feedstocks into products as far as possible, and reduce or eliminate pollution to environment from the beginning. Green chemistry will promote sustainable development and realize the sustainable development goals (SDGs).

2. Green chemistry for SDGs

2.1 Atom economic reactions

To achieve sustainable development, we need enough and sustainable resources, but the resources in the earth are fixed and limited. Therefore, the utilization of the natural resources with high efficiency is of great significance for the sustainable development. An important goal of green chemistry is to maximize the efficiency of use of raw materials and to minimize the creation of waste. For a chemical reaction, atom efficiency is defined as the conversion efficiency of a chemical process in terms of all atoms involved and the desired products. Atom economic reaction is considered with high ratio of atom utilization, in which the conversion of raw materials is maximized and the waste emission is minimized. That is, atom economic reaction can generate more product using less feedstocks, thus reducing or eliminating the pollution caused by waste emission from the beginning. The strategies to improve atom economy mainly include designing alternative synthetic methodology, improving selectivity towards target products, and making good use of byproducts. It is crucial to develop robust and environmentally friendly catalysts to achieve a real atom

economic reaction. The highly effective economic reaction not only saves resource but also prevents the pollution, which affords a significant way for sustainable development.

2.2 Green catalysis

Catalysis represents one of the most important way to achieve the goals established by 12 principles of green chemistry, and is also providing pathways to a sustainable development [2]. Catalysis also plays important role in environmental applications including the destruction of wastes and purification of gases, waters and soil. Noble metal catalysts are widely applied in chemical industry. Due to the limits of the noble metal resources, the low-cost, abundant and environment-friendly metals are expected to replace noble metal catalysts and have been widely investigated with focus on improving their activity comparable to that of noble metal catalysts. Nanocatalysts, particularly, catalysts with single-metal atom, display highly enhanced activity, and have become the frontier of the catalysis in recent years. The metal-free catalysts including organo-catalyst, carbons and ionic liquids without metals have emerged as green alternatives for various kinds of reactions, especially for the production of pharmaceuticals and biologic active molecules.

The bio- and photo-catalysis are considered to be green catalysis, which can be performed in green way under ambient conditions. Electrocatalysis is also a green catalysis, which can adopt green and renewable electricity from wind, tide, etc. However, the efficiency of these kinds of green catalysis is generally very low compared to that of thermo-catalysis. Therefore, exploring catalysts with high efficiency for bio-, photo- and electro-catalysis is of significance for sustainable development. The reduction of CO_2 into fuels and chemicals via bio-, photo- and electro- catalysis provides green routes for CO_2 fixation and transformation, which have been paid much attention in recent years. In addition, the catalysis associated with the use of green solvents is also a green catalytic process.

2.3 Green solvents

As known, over 70% chemical processes require solvents, especially organic solvents that are generally toxic, flammable, and/or corrosive. Therefore, study on green solvents is the most active area of green chemistry research [2], which represents an important challenge because the utilization of green solvents is not a simple replacement to the conventional solvents. The widely investigated green solvents mainly include water, supercritical fluids, ionic liquids and biomass-derived solvents. Besides their green features, the unique properties of green solvents should be investigated to meet the requirements for their applications. Water has been widely applied in inorganic industry, and prevention of water pollution is the main problem in its applications. Recent researches indicate that water is also a good reaction solvent for some organic reactions, showing promising potentials in organic synthesis. Supercritical fluids have temperature- and pressure-controlled properties with liquid- and gas-like performances, which, especially supercritical CO_2, have shown promising applications in chemical processes. Ionic liquids that are completely composed of ions can be designed with green features together with unique properties, which are considered as a kind of green solvents and have attracted much attention in green chemistry. In addition, biomass-derived solvents like glycerol also have attracted attention, which may have great potentials.

2.4 Green carbon sciences

Carbon, the fourth most abundant element in the universe, is the key element of life on earth, and offers us organic materials. The efficient utilization of carbon resources and carbon recycling are of great importance for the sustainable development of our society. In the foreseeing future, fossil resources (raw oil, coal, natural gas and minerals) will still be the main resources of energy and chemicals, thus exploring

green technologies for efficient utilization of fossil carbon resources will still be important task of chemists and engineers. With gradual consumption of fossil carbon resources, biomass as the largest renewable carbon resources has attracted much attention, and related technology to utilize biomass are being developed. The utilization of fossil resources and biomass emits huge amount of CO_2, which results in the CO_2 concentration in air to reach up to 415 ppm in 2018, thus causing serious environmental and social problems. Chemically, feasible and effective solutions to this problem are the efficient use of the limited fossil resources and the development of processes to convert biomass and CO_2 into fuels and value□added chemicals on a large scale. Therefore, Chinese scientists [3] proposed concept of green carbon science with four principles, which focuses on the transformations of carbon-containing compounds in the entire carbon cycle, with the ultimate aim at using carbon resources efficiently and minimizing the net CO_2 emission. This holistic view also has ramifications for related fields including petroleum refining and the production of liquid fuels and chemicals from coal, methane, CO_2, and biomass.

In addition, the recycling and reuse of organic polymers is also an important aspect of green carbon sciences. The spent polymers provide rich renewable carbon resources, and their degradation into chemicals is of significance for sustainable development, which can not only reduce the pollution to the environment but also save the carbon resources.

2.5 Green products

Green products are necessary for sustainable development, which should have the following features: nontoxicity, environmental-friendliness, long life span for use, available recycling, production from natural and/or renewable feedstocks, fabrication with low energy cost, high biodegradability. The green chemicals for agriculture including fertilizers, pesticides, and insecticides can guarantee safe production of enough foods for us. Green pharmaceuticals and medicines can protect our health and lengthen the life span of our humans. Other green products including natural additives for foods, biomass-derived functional materials, natural clays, green coating materials, and so on, can make our life better.

In addition, the recycling of solid wastes including plastic waste, metal waste, glass, and so on, is also of great significance for sustainable development. Transformation of such solid waste into chemicals or useful materials needs chemistry, which is an aspect of green chemistry.

3. Education

Education is perceived as the master key to achieving a sustainable society. The core role of chemistry and chemical industry for sustainable development in modern societies suggests a central role for chemistry education. Green chemistry education aims at incorporating the concept of green chemistry into chemical education, and a major objective is to foster sustainable scientific literacy and to develop corresponding skills among the present and future generations [4]. More importantly, the intention of green chemistry education is to promote the desired types of awareness in the young generations, keeping in mind the importance of social and environmental sustainability and the role that chemistry can play to promote sustainable development, being to allow them to actively learn how to shape society in a positive, sustainable fashion. Therefore, green chemistry education should be and also has been paid much attention all over the world.

Nowadays, more and more female students are educated at high schools and universities, and they should be have equal rights to be educated with green chemistry. More and more female scientists are working in green chemistry fields, and they should be supported equally. It is believable that women are also able to contribute to sustainable development.

4. Conclusion

Green chemistry provides important solutions to sustainable development, which will give us a beautiful and sustainable world. Women working in green chemistry is an important power to contribute to sustainable development of our society. Let's work together, and make our life better and better.

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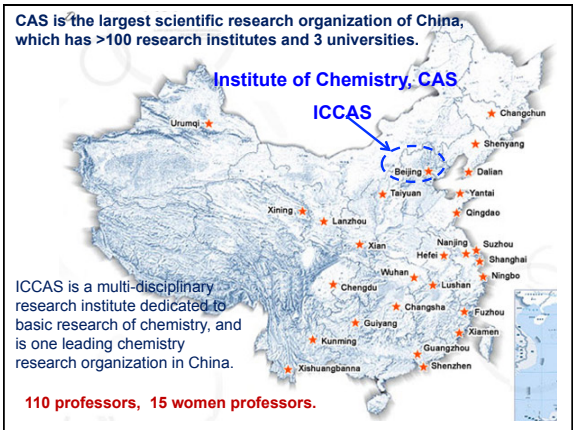
The 9th Japan-China-Korea Women Leaders Forum for Science & Technology,
Ochanomizu University, Otsuka, Bunkyo-ku, Tokyo, Japan, Oct. 10-12, 2019

Green Chemistry Promotes Sustainable Development

Prof. Dr. Zhimin Liu

Institute of Chemistry, Chinese Academy of Sciences (ICCAS), Beijing 100190, China. Homepage: Liuzm.iccas.ac.cn

CAS is the largest scientific research organization of China, which has >100 research institutes and 3 universities.



ICCAS is a multi-disciplinary research institute dedicated to basic research of chemistry, and is one leading chemistry research organization in China.

110 professors, 15 women professors.

CURRICULUM VITAE

Professor Dr. of Chemistry

Education and Employment History

- 1997 University of Petroleum, Ph.D. in Org. Chem. Eng.
- 1999 Postdoctoral fellow of ICCAS
- 1999 Associate Professor of ICCAS
- 2003 Visiting scholar, Nottingham University, UK
- 2006 JSPS invitation fellow, Tohoku University, Japan
- 2007 Group leader
- 2008 Full professor of ICCAS

Research Interests

- **Green chemistry**
- Study on the properties of green solvents including supercritical fluids and ionic liquids;
- Chemical conversion of CO_2 and biomass;
- Green solvent-induced fabrication of functional materials;
- Green catalysis.

Membership

- **Fellow of Royal Society of chemistry**
- Vice Chairman of Committee on *Supercritical Fluid Technology* of Chemical Industry and Engineering Society of China
- Member of Committee on *Ionic Liquids* of Chemical Industry and Engineering Society of China
- Member of Committee on *Green Chemistry* of Chinese Chemical Society
- Member of Committee on *Chemical Thermodynamics and Thermal Analysis* of Chinese Chemical Society
- General Secretary of *Supercritical Fluids* Association of Asia.

Editorial Board member

- **Editor-in-chief** for *Current Opinion in Green and Sustainable Chemistry*
- Editorial board member for Sustainable Chemistry and Pharmacy
- Editorial Advisory Board for Industrial & Engineering Chemistry Research
- Editorial board member for Chinese Science Bulletin
- Editorial board member for Acta Physico-Chimica Sinica

Awards

- Selected as Leading Talent of "National High-Level Personnel of Special Support Program", 2018
- A Second Class Prize of National Natural Science Award of China, 2011.
- **China National Fund for Distinguished Young Scientists**, 2011.
- A Second Class Prize of Science and Technology Award of Beijing, 2007

Green Chemistry Promotes Sustainable Development

- Green chemistry
- Green carbon sciences
- Atom-economic reactions
- Green solvents
- Green products
- Education
- My research interest

Sustainability ?

- "Sustainability" is a concept that is used to distinguish methods and processes that can ensure the long-term productivity of the environment, so that new generations of humans can live on this planet.
- Sustainability has environmental, economic, and social dimensions.

We live in a chemically-dependent society

Over 97% of man-made goods are produced using at least one chemical process. Chemistry plays crucial role in modern civilization.

- **Fertilizers** afford us with enough food
- **Synthetic polymers** give us colorful clothing.
- **Modern construction materials** offer us comfortable housing.
- **Medicine** protects our health and prolongs the lives of our humans.

Chemistry makes our life better.

Great Challenges for Sustainable Development

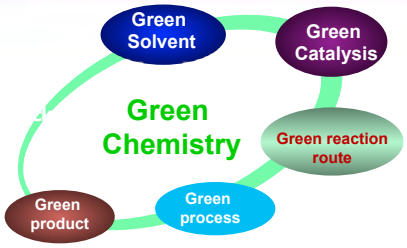
Old Chemical Processes

- Small portion (~10%) of resources we take from earth is converted into products. Most of them is transformed into waste.
- Huge amout of harmful wastes are generated annually, and serious pollution is caused.
- It is not sustainable in products, process and resources.

Green chemistry is highly desirable

New and green chemistry is highly desirable for sustainable development, but challenging!

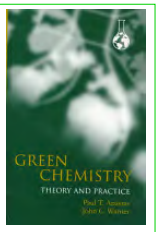
Green Chemistry ?



- A new approach to designing chemicals and chemical transformations that are beneficial for human health and the environment.
- Aiming to save resources and energy, and completely convert feedstocks into target products and eliminate pollution from the beginning.

12 Principles of Green Chemistry

1. Prevention rather than remediation
2. Atom Economy
3. Less Hazardous Chemical Syntheses
4. Designing Safer Chemicals
5. Safer Solvents and Auxiliaries
6. Design for Energy Efficiency
7. Use of Renewable Feedstocks
8. Reduce Derivatives
9. Catalysis
10. Design for Degradation
11. Real-time analysis for Pollution Prevention
12. Inherently Safer Chemistry for Accident Prevention



Anastas, P. T.; Warner, J. C. Green Chemistry: Theory and Practice, Oxford University Press: New York, 1998

Green Chemistry Attracts Worldwide Attention

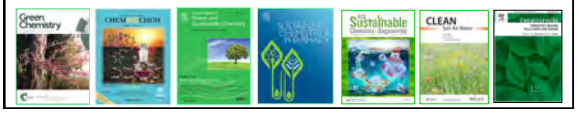
- **Green Chemistry Centers/networks all over the world**
- **IUPAC subcommittee on Green Chemistry (2001)**
- **USA Presidential Green Chemistry Challenge Award (1995)**

  Greener Synthetic Pathways; Greener Reaction Conditions; The Design of Greener Chemicals; Small Business; Academic

- **International conferences on Green Chemistry**

International journals on green chemisty

- Green Chemistry (1999)
- Clean---Soil, Air, Water (2007)
- ChemSusChem (2009)
- Green Chemistry ---Reviews and Letters (2010)
- Green & Sustainable Chemistry (2011)
- ACS Sustainable Chemistry & Engineering (2012)
- Current Opinion in Green and Sustainable Chemistry (2015)
- Sustainable Chemistry and Pharmacy (2017)



We live in the age of carbon

Most of the articles of society are carbon-based. Carbon resource is indispensable for us.

There would be no modern civilization without carbon, but carbon is also threatening the survival of our humans due to our own problems.

Non-renewable

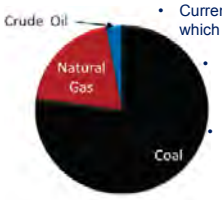
Carbon Resource

C

Renewable

13

Fossil resources

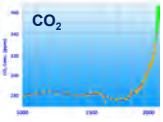


- Currently, we are heavily reliant on fossil resources, which offer us energy and chemicals.
- Oil affords >90% of organic chemicals. But only 10% of petroleum is used to make chemicals.
- Natural gas, with predominate component of methane, is mainly used to produce energy.
- Coal is the largest carbon resource, and it provides the major energy via combustion, meanwhile it emits huge amount of CO_2 together with S-, N-containing compounds, resulting in pollution to environment.
- Fossil resource is the base of chemical industry, but they are finite and increasingly difficult to access. Time is running out for petrochemical feedstocks and for other traditional resources.

14

Renewable resources

- Nature provides us with plentiful biomass. **~200 Billion tons** of lignocellulose is produced every year. But only 4% is utilized as carbon resource. Especially, their transformation to desired products is challenging.



- **~40 Billion tons of CO_2** is emitted from fossil utilization annually, and its concentration in air has reached >400 ppm (in 2018). Only 0.4% is used for chemicals production due to both thermodynamic and kinetic problems.

Efficient utilization of renewable carbon resources is crucial to sustainable development of our society

15

Green Carbon Science (GCS) ?

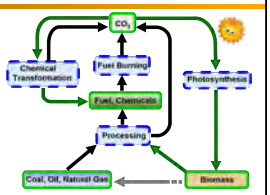
- **Energy generation**

$C + O_2 = CO_2$

-393.5KJ/mol

- **Natural Photosynthesis**

$CO_2 + H_2O \Longrightarrow$ Biomass



GCS Defination

Study and optimization of transformation of carbon-containing compounds, processes involved in the entire carbon cycle from carbon resource processing, carbon energy utilization, CO_2 fixation, and carbon recycling to minimize the carbon unbalance caused by over-consumption of fossil resources.

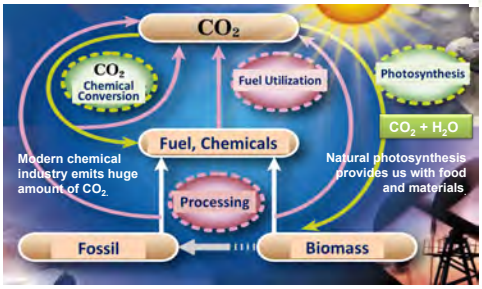
Main research areas

- **Highly efficient utilization of fossil resources**
- **Economic processes to use biomass and CO_2**

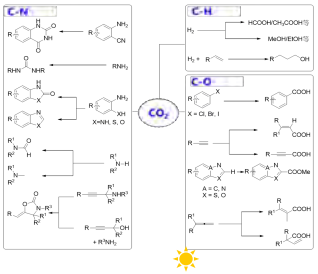
M. Y. He, Y. H. Sun, B. X. Han, *Angew. Chem. Int. Ed.*, 2013, 52, 9620 .

16

Transformation of CO_2



- **Commercial production of urea, salicylic acid, carbonates**
  - ✓ Reduction to fuels, e.g, CO, CH_4, HCOOH, CH_3OH, etc.
  - ✓ Involving the synthesis of various chemicals, e.g., cyclocarbonates, benzimidazoles, N-formylamides, etc.

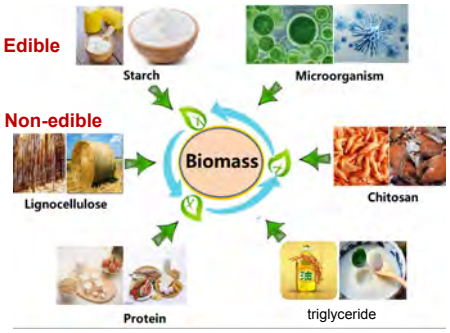


Challenges:

- ➢ Both thermodynamic and kinetic limitations.
- ➢ Photocatalysis and electrocatalysis can overcome the thermodynamic limitation.
- ➢ Cheap and renewable H_2 is important.

Transformation of biomass

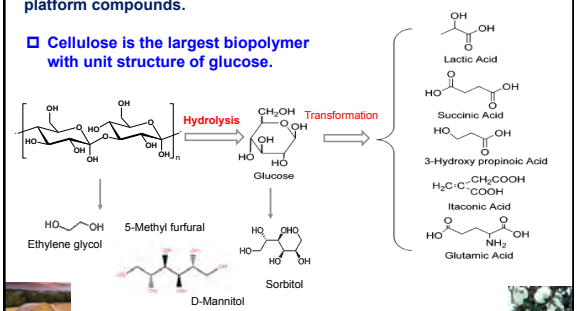
Nature provides us with plentiful renewable carbon resources--biomass.



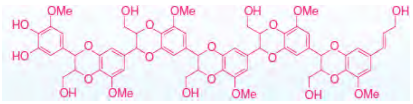
➢ Biomass-derived green and renewable feedstocks

Non-edible biomass includes cellulose, lignin, chitosan and their platform compounds.

- **Cellulose is the largest biopolymer with unit structure of glucose.**

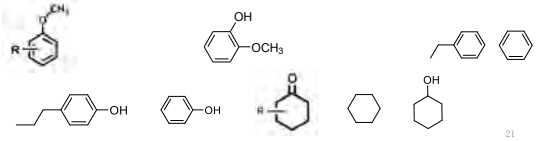


- **Lignin is the second largest biopolymer with aromatic structures, which provides the possibility to afford aromatics from biomass.**



Paper industry produces about 50 million tons of lignin waste annually.

Aromatics produced from lignin



Challenges for biomass transformation

- ➢ Use of lignocelluloses is extremely important, but selective conversion and separation is challenging.
- ➢ Utilization of starch and triglyceride is easier, but their sources are very limited.
- ➢ More attention should be paid to explore processes using the special structure of biomass.
- ➢ Transformation of renewable carbon resource is of great importance, which is a long term task.

➢ Green solvents--- Environment-friendly solvents

Around 70% chemical processes require for solvents.

SOLVENT GUIDE

Ranking	Solvents
Preferred	Water, ethanol, propanol, n-butyl alcohol, AcOEt, AcOiPr, AcOnBu, PhOMe, sulfolane
Preferred or Problematic ?	MeOH, tBuOH, BnOH, ethylene glycol, acetone, MEK, MIBK, cyclohexane, AcOMe, AcOH, Ac_2O
Problematic	Me-THF, heptane, Me-cyclohexane, toluene, xylene, chlorobenzene, acetonitrile, DMPU, DMSO
Problematic or Hazardous	THF, MTBE, cyclohexane, DCM, formic acid, pyridine
Hazardous	iPr_2O, dioxane, DME, pentane, hexane, DMF, DMA, NMP, TED, methoxyethanol
Highly hazardous	Et_2O, benzene, CCl_4, chloroform, DCE, nitromethane

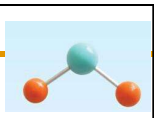
- **~20 Million tons** of harmful solvents are emitted annually, resulting in harm to people and pollution to environment.

Green solvents:

- Water/supercritical water
- Supercritical CO_2
- Ionic liquids
- Polyethylene glycol
- Biomass-derived solvents

The replacement of harmful solvents with green ones needs to reconsider many new issues due to the unique features of green solvents.

Water (H_2O)

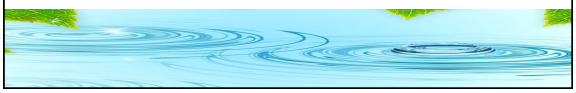


Water is the most accessible green resource in the earth, which has wide applications in industry.

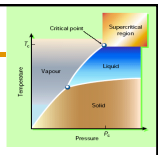
As a chemical feedstock, it can serve as a reductant to provide H, and also as an oxidant to provide O.

As a green solvent, it shows unique performance due to the strong ability to form H-bonding.

Exploring its efficient utilization in chemical processes is of significance for sustainable development.



Supercritical CO_2



Critical Point: 31.1 °C, 7.38 MPa

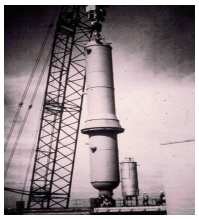
➢ Properties

Gas-like viscosity and diffusion
Liquid-like density
Near zero surface tension
Tunable properties…

➢ Applications

Extraction
Dyeing
Drying
Cleaning
Chemical reactions
Material processing or preparation…

Essential oil
Caffeine
Nicotine

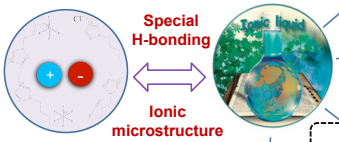


For example, >80% of hops for beer is produced by CO_2 extraction.

Ionic Liquids (ILs)

A kind of organic melton salts composed of organic cations and inorganic/organic anions.

Highly designable
Many kinds



Unique properties

- Wide liquid window
- High thermal and chemical stability
- Negligible vapor pressure
- Wide electrochemical window

Multiple interactions

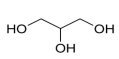
- Coulomb force
- H-bonding
- Van der Waar
- hydrophilic/ hydrophobic interaction

ILs can be designed with green features.

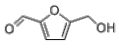
Wide applications

- Solvent
- Catalyst
- Surfactant
- Microwave absorber

Biomass-derived solvents

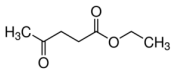


glycerol

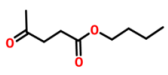


furfural

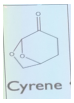
furfuryl alcohol

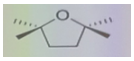


ethyl levulinate



butyl levulinate





2,2,5,5-tetramethytoxolane

These solvents will replace some traditional solvents.

➢ Green products

Green chemicals, degradable materials …

Degradable polymers

- We live in a world where synthetic plastics are everywhere. From clothing to crisp packages and from bottles to buckets, plastics make our lives more convenient.
- But >80% plastics we consume ends up as waste, which causes serious problems to us and to our environment. It was reported…

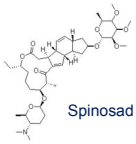
✓ Degradable polymers are highly required.

✓ Natural polymers such as cellulose, chitosan, wool, silk, spidersilk and mussel byssus fibres, and biopolymer-based nanocomposites, present an attractive alternative for synthetic polymers derived from petrochemicals.

☐ Green pesticides

Nowadays, pesticides have been widely applied in agriculture, which improves the crop yields, but are harmful to human beings and to soil.

Green pesticides that are low-toxic, high efficient, and degradable are of great significance for sustainable development.



Spinosad

Circular economy

By recovering resources from the waste materials, we can reduce our reliant on virgin feedstocks that are not sustainable as well as reducing the quantity of materials going to landfill sites.

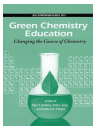
Recycling is essential for environmental sustainability.

Rubber recycling. Rubber is used in a vast number of products, and the volume of rubber waste produced globally makes it difficult to manage because accumulated waste rubber, especially in the form of tyres, can pose a significant fire risk. Recycling rubber not only prevents this problem but can produce new materials with desirable properties that virgin rubbers lack.

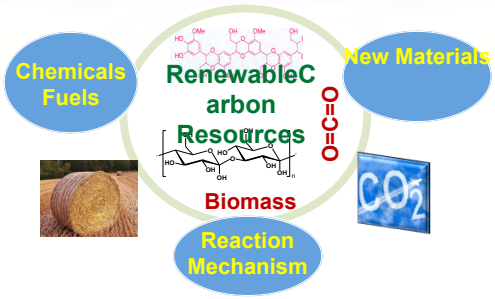
Element Recovery. Increased consumption of electronic equipment has brought with it a greater demand for rare earth elements and metals. It is predicted that the global supply of rare earth elements could soon be exhausted. A sustainable approach to the use and recovery of rare earth elements is highly needed.

Green chemistry education

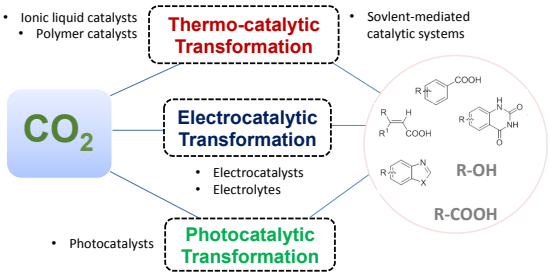
- Green Chemistry education has been paid worldwide attention.
- A wide range of new approaches, courses, tools, and materials related to green chemistry have been introduced and demonstrated in the **chemistry curriculum** in colleges and universities around the world.
- Green chemistry education must be integrated into the way we teach scientists from the earliest ages, e.g., from high school students.



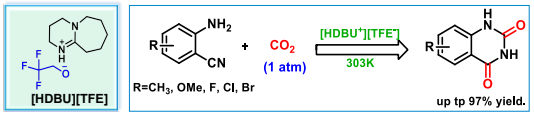
My research interest



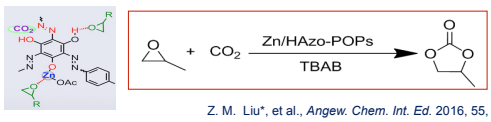
Transformation of carbon dioxide



Atom-economic reactions



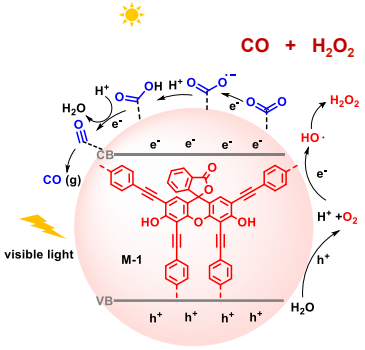
Z. M. Liu,* et al, *Angew. Chem. In. Ed.*, 2014, 53, 5922.



Z. M. Liu*, et al., *Angew. Chem. Int. Ed.* 2016, 55, 9685.

No byproducts

Artificial photosynthesis



Z. M. Liu*, et al, *Angew. Chem. In. Ed.*, 2019, 58, 632-636.

Summary and outlook

Green chemistry provides a concrete path to solving environmental problems.

Green chemistry is the way for sustainable development, and it is the future of chemical industry

Our woman scientists can play key role in development of green and sustainable chemistry.

My group

张宏晔、赵燕飞、杨珍珍、于博

许环军、郝磊端、高翔马志爽、纪桂鹏、胡彩玲、吴云雁、罗小颖、杨鹏、于笑笑、李瑞鹏张峰涛、柯振刚、王

Thank you for your attention!

Poster Session

Poster Session Coordinator (Japan)

Eiko NAKAYAMA
Professor, *Faculty of Life and Environmental Science and Graduate School of Life Sciences, Showa Women's University*

Education

Degree: BA, Description: in Agricultural Science, Kyoto Univ., Japan, 1982
Degree: PhD, Description: in Agricultural Science, Kyoto Univ. Grad. Sch., Japan, 1995

Research Field

Wood Science and Technology
Environmental Science

Career History

Showa Women's University, Tokyo, Japan
Professor, Faculty of Life and Environmental Science and Graduate School of Life Sciences (2007-)
Associate Professor, Faculty of Life and Environmental Science and Graduate School of Life Sciences (1997-2007)
Lecturer, Faculty of Life and Environmental Science (1989-1997)
Research Associate, Faculty of Life and Environmental Science (1985-1989)
RIKEN: Institute of Physical and Chemical Research, Wako, Japan
Guest Researcher, Polymer Chemistry Laboratory (2005-2006)
Collaborative Researcher, Polymer Chemistry Laboratory (1996-2005)
LUKE: Natural Resources Institute Finland, Helsinki, Finland

Civic, Political, and Philanthropic Activities

The Japan Wood Research Society, Director (2011-)
The Society of Japanese Women Scientists, Director (2005-)

Poster Session Coordinator (Japan)

Yoshihito MORI
Professor, Ochanomizu University
Principal, Ochanomizu University Kindergarten

Education

Degree: BParm in Pharmaceutical Sciences, Tokusihma Univ., Japan, 1983
Degree: PharmD in Pharmaceutical Sciences, Hokkaido Univ. Grad. Sch., Japan, 1988

Research Field

Nonlinear Phenomena in physico-chemical system and microwave technology application for botanical essential oil extraction.

Career History

Pharmacist, Toyama Medical and Pharmaceutical University Hospital, 1988-1989; Researcher, Molecular Institute of Sciences, 1989-1995; Research associate, Nagoya Institute of Technology, 1995-1998; Associate Professor, Ochanomizu University; 1998-2014, Professor, Ochanomizu University, 2014 up to now. Ochanomizu University Izumi Nursery Principal, 2014-2016.

Achievements

The nonlinear phenomena research revealed surface tension-driven oil-droplet movement was directed in an asymmetrical boundary and surfactant foam production in space was bifurcated on gravity and the collaboration with Afghan women scientists was made on microwave-assisted essential oil extraction.

Civic, Political, and Philanthropic Activities

Member of Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering, 2005 up to now; Chair, Science Summer School for Girls at National Women's Education Center, Japan, 2007; Member of Gender-equality Promoting Committee of The Chemical Society of Japan, 2004 up to now. Member of Tokyo Bunkyo-ward equality committee, 2008 up to now. Host professor of Japan governmental aim for Afghan women promotion, 2003 up now

Current Memberships

Member of The Chemical Society of Japan: Member of Japan Electromagnetic Energy Application: Member of The Japan Society of Microgravity Application.

Poster Session Coordinator (Japan)

Maki IWAKUMA
Vice President, The Institution of Professional Engineers, Japan
Fellow of The Institution of Professional Engineers, Japan
Fellow of Japan Society of Civil Engineers

Education

Degree: Bachelor of Agriculture, Faculty of Horticulture, Chiba University

Registered Professional Engineer, Japan (Applied Science, No.15111)

Research Field

Environmental Study and Research

Employment Record:

1972-: Engineer, CTI Engineering Co., Ltd.

1989-1994: General Manager, R&D Division, Environmental and Biotechnology CTI Engineering Co., Ltd

1994-2005: Director, CTI Science Systems Co., Ltd.,

2006-2009: Executive Vice President, CTI Science Systems Co., Ltd

2010-Present: Chief Engineer, Institute for Environmental Monitoring TOKEN C.C.E. Consultants Co., Ltd.

Professional Memberships:

As the Institution of Professional Engineers, Japan (IPEJ)

2005-2009: Board of Directors Member

2005-2007: Vice-Chair, Policy and Planning Committee

2007-2009: Vice President / Chair, Publicity Committee

2011-2015: Chair, Gender Equality Committee

2017-Present: Board of Directors Member /Vice President/ Chair, Corporate Planning Committee

As Women Engineers Society

1985-1991: Committee Member, the Society of Women Civil Engineers

1991-1997: Secretary-General, the Society of Women Civil Engineers

1998-1999: Vice-Chair, 11th International Conference of Women Engineers and Scientists (ICWES-11)

2004-Present: Committee Member, International Network of Women Engineers and Scientists, Japan

2009-2011: Director, the Woman Professional Engineers Society of Japan (Non-Profit Organization)

2015-Present: Committee Member, Steering Committee of National Women's Education Center

Awards

1996: Award of the Institution of Professional Engineers, Japan

Poster Session

（１） SJWS:

Recent Activities of the Society of Japanese Women Scientists

（２） JWEF:

History, Objectives and Activities of Japan Women Engineers Forum

（３）Girls’ STEM Career Path Project (GSTEM-CPP):

Junko Kogure / Megumi Furuichi
Encouraging Teenage Girls to Choose Career in STEM Field
– Report from Natsugaku (Girls’ Science Summer Camp)

（４）Dilinigeer Dilixiati, Maya Ueda, and Toshihiro Kondo

(Graduate School of Humanities and Sciences, Ochanomizu University)
High Electrocatalytic Activity for Oxygen Reduction Reaction of Ni and Co Core-Pt Shell Nanoparticles

（５）Jafari Samira

(Department of Chemistry and Biochemistry, Division of Advanced Science, Graduate School of Humanities and Sciences, Ochanomizu University)
Afghan *Achillea santolina* L. essential oil extraction by conventional and microwave heating

（６）ESCO　(Environmental Science Club of Ochanomizu University)
https://ochakan.1net.jp

Nanako KAWANO and Shoko TANAKA
Outreach Activity in Science

Recent Activities of the Society of Japanese Women Scientists (SJWS)

Establishment, purpose, membership of SJWS

The Society of Japanese Women Scientists (SJWS) was established in April, 1958 to foster friendship among female scientists, facilitate knowledge exchange among them in various fields of research and provide support during their career with the ultimate goal of advancing world peace. Since April, 2014, SJWS has become the general incorporated association.

Now in 2019, the number of members is about 350, and there are a wide range of members, including researchers in science, engineering, medicine, pharmacy, and agriculture, belonging to universities, research institutions, as well as researchers and engineers from companies. It is a collaborative organization of the Science Council of Japan, and is active in Hokkaido/Tohoku Block, Kanto Block, Tokai/Chubu/Hokuriku Block, Kansai Block, Chugoku/Shikoku/Kyushu/Okinawa Block.

SJWS supports female researchers and scientists♪

Activities I

- Seminars for SJWS members and non-members who are active in the natural science field, including famous foreign researchers.
- Symposiums and social gatherings of female scientists.
- Science classes for small children and experimental guidance at summer school for high school girls.
- Academic journals published by Japanese women scientists (once a year), NEWS published (twice a year).
- Member of the Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE).
- Launched SJWS Science Communicator Certification System (2007-).

Activities II

- SJWS Early Career Investigator Award; award will be given for members of the Society who have made research achievements in the field of natural sciences and can expect future prospects, agree to the purpose of the Society, and strive to achieve it. Since 1996, 49 people have been awarded.
- SJWS Distinguished Service Award; award certificates and anniversary gifts will be presented to those who have contributed to the promotion and research of Japanese female scientists (non-members are allowed) or who have made significant contributions to the association. Since June 1996, 44 people (including two men) have been awarded.

☆ 25th Early Career Investigator Award and Distinguished Service Award to be recruited

Recent Activities

■The 12th Academic Conference & 60th Anniversary Lecture was held in November 3, 2018 (Sat / Holiday) at Showa Women's University Cosmos Hall & Sofia

◇ Commemorative lecture 1
RIKEN Center for Developmental Biology (CDB)
Masayo Takahashi, M.D., Ph.D., Project leader

◇ Commemorative lecture 2
Okinawa Institute of Science and Technology Graduate University (OIST) Machi Dilworth, Vice President for Gender Equality and Human Resources Development

The 24th (2019) Awards Ceremony

The 12th (2018) Academic Conference & 60th Anniversary Lecture

■Journal of the Society of Japanese Women's Scientists,
Vol.18, No. 1, 2018
☆We are waiting for your submissions.
Please contact our website.
http://www.sjws.info/english/index.html

SJWS office

in Kondoh laboratory, Tokyo Institute of Technology
B-60, 4259 Nagatsuta-cho,Midori-ku, Yokohama, Kanagawa, 226-8501 JAPAN
E-mail: sjws-office@sjws.info Tel & Fax : 045-924-5800 URL: http://www.sjws.info/

Japan Women Engineers Forum

What JWEF is:

JWEF was established in 1992 for women engineers to achieve the objectives by networking and exchanging information. The objectives are to improve each engineer's skill, to create the comfortable working environment where women engineers can demonstrate own abilities, and to contribute to society in increasing the number of women engineers.

History:

Japan experiences the industrial restructuring driven by specialization and advancement in science and technology. Accordingly, the mobility of engineering population and the diversity of career paths and responsibilities in the profession have been increasing.

Most of all, there has been a growing demand for engineers. Meanwhile, many women engineers have made significant contribution to the profession.

However, the absolute number of women engineers is still small. Also, the individual expertise is not always reflected on current human resources for engineering.

JWEF promotes networking among women engineers who often leave to be isolated in their workplaces, such as enterprises, educational and research institutes.

We hold various training courses across sectors and fields. These activities provide opportunities for women to achieve the self-development as well as to be empowered to play an active role in the profession.

Furthermore, JWEF conducts various researches and studies, and develops socially influential recommendations based on the findings.

JWEF Objectives:

- Networking and Friendship

  We promote
  - ✧ Networking among women engineers across specialties
  - ✧ Networking with female students aspiring to an engineering career
  - ✧ Networking with other Japanese as well as overseas organizations including INWES (International Network of Women Engineers & Scientist)
  - ✧ Friendship through regular meetings and interest groups
- Exchanging Information

  We promote
  - ✧ Exchanging information across sectors and fields
  - ✧ Research and Study on women engineers
- Increasing and Empowering Women Engineers

  We provide
  - ✧ Career information and role models for female students including junior/senior high school and university students
  - ✧ Recommendations and messages to build gender-equal society
- Career and Leadership Development

  We encourage
  - ✧ Career and leadership development through lectures and training courses
  - ✧ Enhancing knowledge and skills through study tours and workshops

URL: www.jwef.jp , Email: info@jwef.jp

Activities:

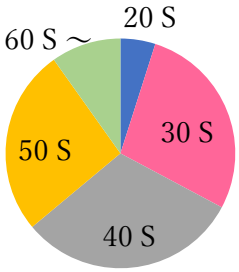
- Symposium, Regular meeting, and sight visit
  Recent Events and topics
  - ✧ What is “Unconscious Bias” and how to engage
  - ✧ Food loss -Way and which women engineers can contribute for future -from view point of SDGs,
  - ✧ Sight visits
    - The Latest and largest logistics terminal in Japan,
    - The changes in gigantic Steel industry, work flow and labor force
    - Future of space industry – Japan Aerospace Exploration Agency

- JWEF AWARD -Incentive Award to young woman engineer
  To acknowledge and promote the importance and contribution of women engineers in the industry, JWEF awards a young woman, every year, as an excellent role model, who presents her leadership both in the work place and society.
- Study group
  - ✧ Technology Study group - To grasp the latest industry trends, its challenges, policies, and technologies, the developers, and/or, the policy maker, or industry specialists give lectures.
    Topics are;
    - The relation between Primary Industry and Disaster prevention
    - How industries engage SDGs (sustainable Developments goals).
    - Manufacturing technologies of hardware and components
    - Image Processing Technologies and creation of future value
    - Robotics,
    - Space Industry and more
  - ✧ Mentoring Skills Training Group – Improving mentoring skills through actual/real mentoring exercises, and mutual training for mentoring across the different age group.
  - ✧ Targeting next generations, JWEF provides High School and Uni-Students with practical advice and guidance for career.
  - ✧ Run the trial class for fabrication laboratories, and let children experience the joy of creation/productions. Target -teens under 15 years old.
- JWEF News Letter, and periodical information provision via Mail system
- Networking
  - ✧ Regional/section meeting to energize and promote mutual exchanges between the member who are away from capital and big cities.
  - ✧ Cross cultural exchanges between different communities, such as, international bodies, scientist-communities, and delegation to the overseas conference and events.
  - ✧ Information exchange between corporate member companies.
  - ✧ Information exchange between senior member
  - ✧ Social gathering, meeting up with various communities both domestic and overseas. JNWES(Japan Network of Women Engineers and Scientists)、JSPEW(Japan Society of Professional Engineers of Women) JSWS(Japan Society of Women Scientists) and other.

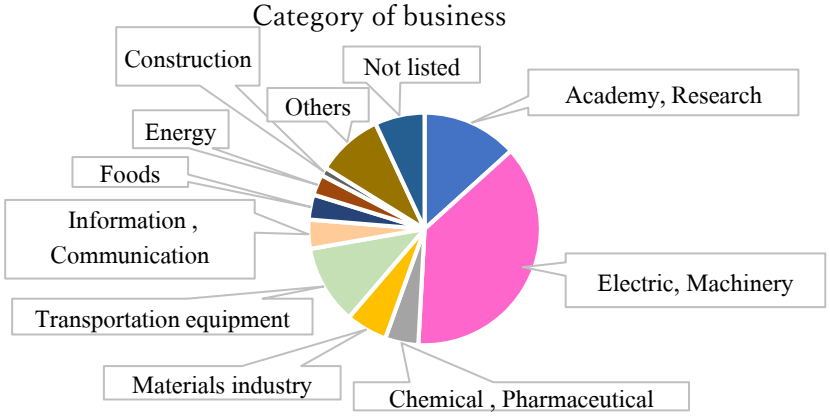
Composition of JWEF member:

JWEF is constructed by 3 categories, one is individual member, from various industries, different generations and positions, next category is the student member, and the third group is the corporate member, which are increased proved by the importance and promotion of diversity and inclusion related activities. ‘As of 2018 Individual member (adults and students) 100, Corporate member (companies) 19.

Ages of Individual Member



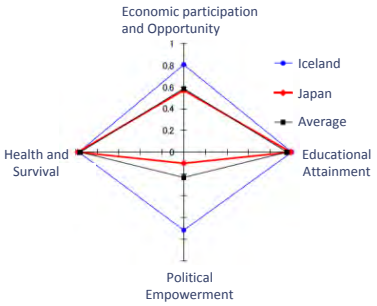
Category of business



Encouraging Teenage Girls to Choose Career in STEM Field – Report from Natsugaku (Girls' Science Summer Camp)

Oct 11, 2019
Girls' STEM Career Path Project (GSTEM-CPP)
Junko Kogure / Megumi Furuichi

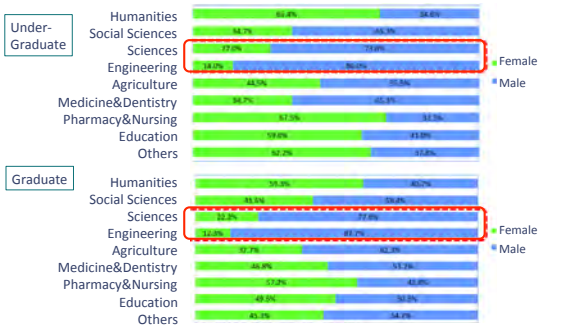
Gender Gap Index : Our common subject



Rank	Nation	Score
1	Iceland	0.858
2	Norway	0.835
3	Sweden	0.822
12	France	0.779
14	Germany	0.776
15	UK	0.774
51	US	0.720
75	Russia	0.701
103	China	0.673
110	**Japan**	**0.662**
115	Korea	0.657

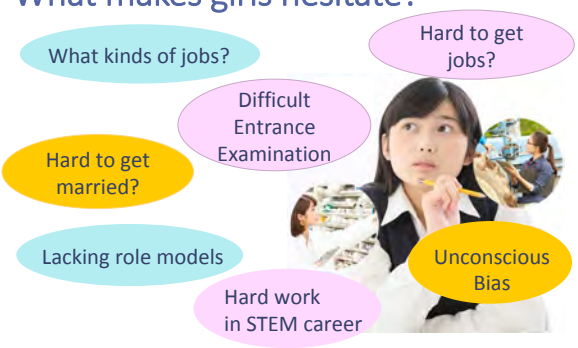
Source: Global Gender Gap Report 2018

Female's low rate in Japanese STEM fields

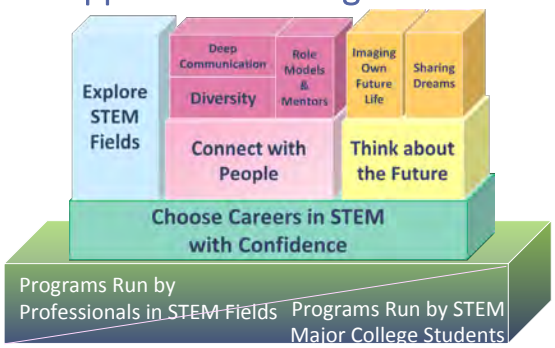


Source: School Basic Survey 2016 (Ministry of education)

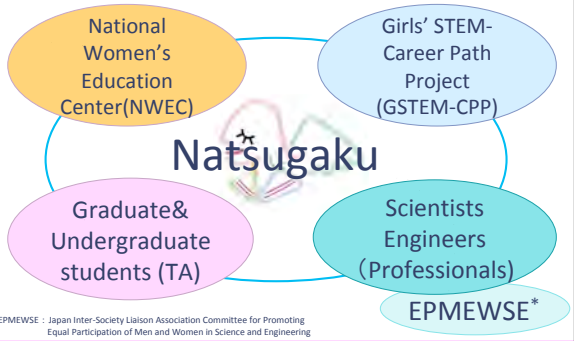
What makes girls hesitate?



Our approach in Natsugaku



Teamwork beyond generation



*EPMEWSE : Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering

Natsugaku (Science summer camp)

Unique Points

- Teaching assistants
  - Programs they voluntarily organized
  - Detailed and customized support for girls
- Many organizations & staff

Girls can:
  - explore various STEM fields
  - meet various "Real" role models

Point (1) – Teaching assistants (TA)

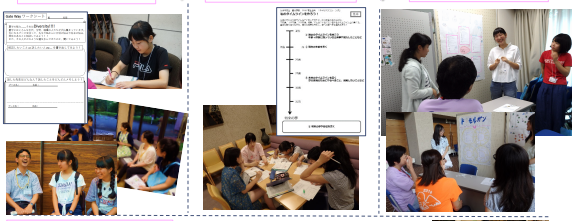
- 30 Female grad & undergrad students in STEM major
- Support girls' activities during camp
- Organize & run programs

Original Point (2) - Many organizations & staff

- Over 50 organizations & 250 staff
- Experiments & poster presentations
- "Real" role models for girls

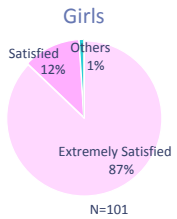
Programs for girls (Organized by TA)

Meet role models in person → Image own future in STEM career → Tell own dream in STEM career



Share their thoughts

High satisfaction answered



Girls' reports with their experiences after Natsugaku

- Presentation as a research project
- Application for overseas training program
- English speech contest

Acknowledgement

National Women's Education Center

Natsugaku Planning Committee

Students' Natsugaku Planning Committee

Over 250 delegates from member organization of the Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering

Grant

Noevir Green Foundation

Other support

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JSR Corp.
Pacific Consultants Co., LTD.
Hitachi Chemical Co., Ltd.
Japan Women Engineers Forum.
The Japan Society of Applied Physics.
The Japan Society for Industrial and Applied Mathematics.
PLUS Corp.
CLEA Japan, Inc.
KIOXIA Corporation.
Lion Corp.
Chugai Pharmaceutical Co., Ltd.
Wacker Asahikasei Silicone Co., Ltd.
MITSUBISHI MOTORS CORPORATION.
Gakken Holdings Co., Ltd.
SHIMADZU CORPORATION.
Sumitomo Dainippon Pharma Co., Ltd.
The Molecular Biology Society of Japan.
The Iron and Steel Institute of Japan

High Electrocatalytic Activity for Oxygen Reduction Reaction of Ni and Co Core-Pt Shell Nanoparticles

Dilinigeer Dilixiati, Maya Ueda, and Toshihiro Kondo

Graduate School of Humanities and Sciences, Ochanomizu University

Introduction

Polymer electrolyte fuel cell (PEFC) has been receiving intense attention as an efficient and clean power source for stationary and automotive applications. Platinum (Pt) is the most stable and active catalyst for the oxygen reduction reaction (ORR) at the cathode (Eqs. (a)) of the PEFC. However, Pt is an expensive precious metal, and moreover, Pt electrocatalytic activity for ORR is not enough to actual operation of PEFC. In order to achieve higher performance and lower cost, the core-shell typed nanoparticles with non-noble metal as a core and noble metal as a shell have been expected.
In the Kondo laboratory, we have succeeded to electrochemically construct Ni and Co core - Pt shell nanoparticles on the glassy carbon electrode surfaces and to obtain the higher electrocatalytic activity for the ORR than that of the polycrystalline Pt. In this study, it is aimed to construct the core - shell nanoparticles with higher electrocatalytic activity for the ORR by reviewing how to construct nanoparticles. Here, the particle size was controlled by the potential step method to construct fine Ni core - Pt shell nanoparticles, and their electrocatalytic activity was evaluated using the rotating disk electrode (RDE) system.

core-shell particle

$O_2 + 4H^+ + 4e^- \rightarrow 2H_2O$ $E^0 = 1.23$ V (vs. NHE) (a)

Experimental

1. Ni nanoparticle preparation

After the pre-treatment of the glassy carbon electrode (GCE) substrates, the potential of the GCE in the deaerated 0.1 M Na_2SO_4 + 0.1 M $NiSO_4$ electrolyte solution was stepped to several potentials and determine the stepped potential to be -1.67 V (vs. MSE), where the nuclear formation and growth simultaneously take place.

Fig. 1 (a) Nucleation and growth in instantaneous mode

Fig. 1 (b) Nucleation and growth in progressive mode

2. Ni core - Pt shell nanoparticles preparation

Ni nuclear formation takes place just after the potential is stepped. In such instantaneous mode, the size of the Ni nanoparticles can be controlled only by the stepped periods, which were 2 s, 5 s, 10 s, and 20 s. Just after the potential stepped period passed, the potential control was off and the electrode potential was back to an open circuit state. Then, a few drops of concentrated K_2PtCl_4 solution was added into the electrolyte solution and kept for overnight during monitoring OCP.

3. ORR measurements

After ultrasonic washing with ultrapure water for 5 min, the surface area of Pt covered nanoparticles was evaluated by CV, measured in the deaerated 50 mM H_2SO_4 and the electrocatalytic activity for ORR was evaluated by measuring linear sweep voltammogram (LSV) in the oxygen saturated 0.1 M $HClO_4$.

Instantaneous and progressive modes based on Eqs. (b) and (c):

$$(i/i_m)^2_{\text{instantaneous}} = \frac{1.9542}{t/t_m}\{1 - exp[-1.2564(t/t_m)]\}^2 \quad \text{(b)}$$

$$(i/i_m)^2_{\text{progressive}} = \frac{1.2254}{t/t_m}\{1 - exp[-2.3367(t/t_m)^2]\}^2 \quad \text{(c)}$$

Results and Discussion

Ni nanoparticle preparation

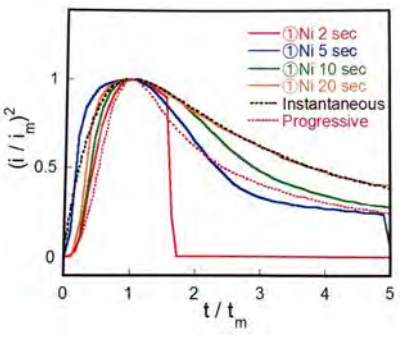


Fig. 2 Chronoamperograms during Ni nanoparticle preparation.

RDE measurements

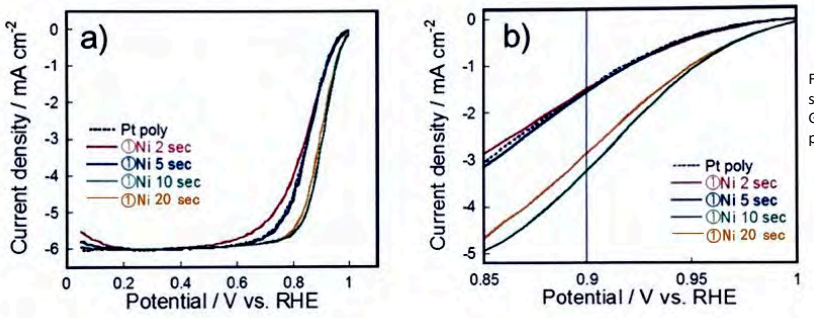


Fig. 3 LSVs of the Ni core - Pt shell nanoparticle modified GCE electrodes and polycrystalline Pt electrode.

Ni deposition time	J_k/mA cm^{-2}	$E_{1/2}$/V
2 sec	2.012	0.84
5 sec	2.103	0.85
10 sec	6.969	0.90
20 sec	4.482	0.89
Pt ploy	1.989	0.85

Table I. Analyzed data of kinetic current density, J_k, at 0.90 V and half- wave potential, $E_{1/2}$.

Conclusion

- As clearly shown in Fig. 2, when the potential of the GCE was stepped to -1.67 V, Ni nanoparticles can be deposited on the GCE surface with an instantaneous mode.
- From Fig. 3 and Table 1, the electrocatalytic activities of Ni core - Pt shell nanoparticles prepared for the 10 sec deposition period was 3.5 times higher than that of polycrystalline Pt and was highest among Ni core - Pt shell nanoparticles prepared in this study. This result suggests that the size of core - shell nanoparticle is not important, but the thickness of Pt film on Ni is the key factor for the ORR.

Future work

1. Control the thickness of the Pt shell.
2. Preparation of Co core-Pt shell nanoparticles.

Abstract

Afghan *Achillea santolina* L. essential oil extraction by conventional and microwave heating

Jafari Samira

Department of Chemistry and Biochemistry, Division of Advanced Science, Graduate School of Humanities and Sciences, Ochanomizu University

Microwave technology has attracted attention in recent years. Microwave technology was applied in communication for the first time, but it is used in many fields now. In particular, it is employed in medicinal plant researches for the extraction of essential oils due to its specific heating mechanism, cost, and applicability in atmospheric condition.

Afghanistan is a mountainous country with a high continental climate. The climate and geographical location of Afghanistan have contributed to the diversity and richness of the plant flora in this country. Moreover, most of these plants contain essential oils, however, these essential oils were not extracted and used before. Therefore, the aim of this study is the extraction of essential oil from medicinal plants of Afghanistan by hydrodistillation and microwave-assisted hydrodistillation methods, as well as analysis of the obtained essential oil.

Afghanistan flora comprises about 5000 species and 30% of them are endemic. Traditional medicine in Afghanistan has a long history. For example, people of Wakhan Corridor and Pamir have used medicinal plants to cure their illnesses such as infectious disease, fever, and pain. Additionally, Pamiri people in Afghanistan and Tajikistan, prepare the medical herbs as decoction or tea as well as they use fresh or dried different parts of medicinal plants. Asteraceae is the largest vascular plant family which comprises 1600 genera and 24000 species. Furthermore, four important and famous genera of this family are Artemisia (500 species), Centaurea (500-600 species), helichrysum (600 species), and Achillea (140 species). There are 705 species of Asteraceae family in Afghanistan that 192 of them are endemic. Together with, 17 species of Asteraceae have medicinal value and 15 species contain essential oils. *Achillea santolina* L. is one of the members of genus Achillea (Asteraceae family) that can be found in Afghanistan, Jordan, Algeria, and Egypt and it contains essential oil. There are conventional and nonconventional methods for extraction of essential oils. Microwave-assisted extraction is one of the modern techniques for the extraction of essential oils from plants that has some advantages over conventional methods such as short extraction time, low solvent consumption, eco-friendly and efficiency. In this study, *Achillea santolina* L. is used for the extraction of essential oil by hydrodistillation and microwave-assisted hydrodistillation extraction methods.

The dried flowering aerial parts of *Achillea santolina* L. collected from Mazar-e-sharif was subjected to HD and MAHD extraction. For the MAHD extraction, a single-mode microwave extractor was used that the volume of its flask is 50 mL. Additionally, different power, time and amount of plant materials were examined in the microwave-assisted extraction.

The maximum used power was 210 W and the minimum used power was 180 W for 15- 30 min. The yield of extracted essential oil by HD extraction method was 0.75%. Whereas, the essential oil could not be extracted from *A. santolina* L. using the MAHD extraction method because this plant has less amount of essential oil and it is needed to use more amount of plant materials for the extraction.

High performance thin layer chromatography (HPTLC) with the support of an image processing software was used for the qualitative and quantitative analysis of the obtained essential oil by HD extraction method. The HPTLC analysis was performed using a silica gel 60 sheet and the mixture of toluene-acetone (95:5 v/v) in the twin trough glass chamber. As well as, visualization of the HPTLC sheet was carried out using the anisaldehyde derivatizing reagent. For the image analysis of HPTLC chromatogram, the scanned HPTLC chromatogram was converted to a densitogram using ImageJ software for further analysis. The R*f* values of visualized zones were calculated using ImageJ. Then, the qualitative analysis was performed by comparison of the colors and R*f* values of visualized zones. Therefore, the three contents of the obtained essential oil were identified that were (+)-limonene, (-)-β-pinene and (-)borneol. In quantitative analysis, the concentration of β-pinene and borneol were determined. The ImageJ software was used to illustrate the calibration curves of β-pinene and borneol and the amount of these two contents were calculated by the obtained regression equation from the calibration curves of β-pinene and borneol. The concentration of β-pinene and borneol were determined 5% and 2.25% respectively in the essential oil of *A. santolina* L. As well as, the reproducibility of chromatographic method and image analyzing method was assured by calculating the R*f* values and concentration of β-pinene and borneol using ImageJ.

In conclusion, *A. santolina* L. essential oil was extracted by MAHD and HD methods, as well as the obtained essential oil was analyzed qualitatively and quantitatively in this study. The yield of extracted oil by HD extraction was 0.75%, but the extraction of the essential oil by MAHD was not succeeded and the amount of the essential oil was very small and not recoverable. In addition, the qualitative and quantitative analysis was performed by HPTLC with the support of an image processing software. In qualitative analysis, three contents of the essential oil were identified which were (+)-limonene, (-)-β-pinene and (-)borneol. In quantitative analysis, the concentrations of β-pinene and borneol were determined that were 5% and 2.25% respectively. Furthermore, this study can contribute to future studies on this plant from different parts of Afghanistan, as well as extraction by single-mood microwave extractor can be applied on other plants of Afghanistan that are rich in essential oils. on the other hand, the antioxidant and antimicrobial properties of Afghan *A. santolina* L. can be examined in future studies.

Afghan *Achillea santolina* L. essential oil extraction by conventional and microwave heating

Samira JAFARI
Chemistry and Biochemistry department / Advanced Sciences
Ochanimizu University

2019/10/11

1.Introduction

- Afghanistan is a mountainous country which is rich in plant flora. Most of these plants contain essential oils.

Figure1. Afghanistan map

- Essential oils are secondary metabolites which are naturally produced by plants. Almost 3000 essential oils are known which 300 of them are used in pharmaceutical, food, comsmetic and perfume industries. (1)

1. F. Bakkali et al, 2007

1.Introduction

- There are conventional and non conventional methods for essential oil extraction.
- Microwave is a modern method that has some advantages such as short extraction time, using small amount of solvent for extraction and it is environmental friendly.
- This methods can be used to extract Afghan plant essential oils.

➢ The aim of this study is extraction and analysis of essential oil of ***Achillea santolina*** **L. (Asteraceae)** (one of the medicinal plants of Afghanistan).

2. Exprimental

I. Plant Material: *Achillea santolina L.* was collected in May 2017 in Balkh city and dried in the shape at room temperature.

Figure2. The field where Achillea santolina was collected, Balkh city

Figure3. Collected areal parts of Achillea santolina

2. Exprimental

II. Conventional Hydrodistillation Extraction Method: 100 g dried powdered areal parts of *Achillea santolina L.* was subjected to hydrodistillation extraction using a Clevenger type apparatus for 5 h.

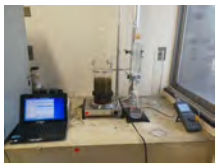


Figure4. Hydrodistillation extraction process

2. Exprimental

III. Microwave Assisted Hydrodistillation Extraction Method: Microwave extraction was performed by using 7g of dried aerial parts of plant in a single mode microwave irradiator at 210 W power for 30 min.

Figure5. Microwave extraction process

2. Exprimental

IV. Analysis Method: HPTLC with support of an image processing software was used for analysis of the essential oil. Chromatography was carried out on a 10*10 cm HPTLC 60 F_{254}, aluminum sheet (Merck, Darmstadt, Germany). Mixture of toluene and acetone (95:5) was used as mobile phase. The spots were visualized by using anisaldehyde reagent.

3. Results

I. Essential oil yield:

The essential oil yield extracted by hydrodistillation was 0.75%.

The essential oil yield in microwave was very small amount and not measurable.

Figure6. Extracted essential oil by hydrodistillation

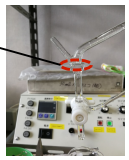


Figure7. Extracted essential oil by microwave

3. Results

II. Qualitative analysis:

To determine compositions of the essential oil, the color and R*f*s of spots was observed. The R*f*s of sample and standards was calculate by a software after converting the scanned photos of HPTLC sheet to a plot profile.

Table1. R*f* values of standards and sample

No	Composition	Standard R*f*	Sample R*f*
1	Borneol	0.49	0.49
2	D-limonene	0.84	0.84
3	β- pinene	0.67	0.68

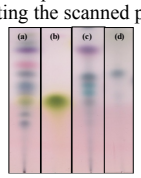


Figure8. HPTLC-chromatogram of extracted sample solution(a) and standards of borneol (b), D-limonene (c) and β-pinene (d).

3. Results

III. Quantitative analysis:

Quantitative analysis of compositions is performed by illustration of calibration curves of standards.

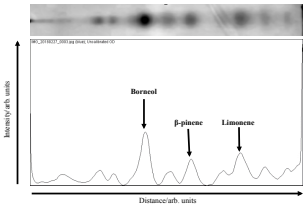
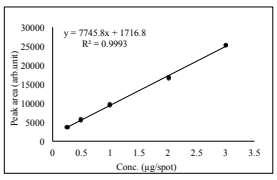
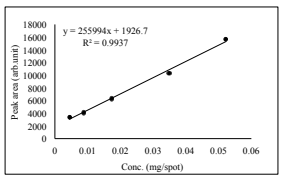


Figure9. HPTLC-chromatogram

3. Results



Calibration curve of borneol



Calibration curve of β-pinene

3. Results

Table 2. Borneol and β-pinene compositions of *A. santolina* L. essential oil with their chemical structure, linear range, linear equation and percentage of concentrations.

Content	Chemical structure	Linear range	Linear equation	Conc. (%)
Borneol		0.25-3 (µg/spot)	y = 7745.8x + 1716.8	2.25
β-pinene		0.0044-0.0523 (mg/spot)	y = 255994x + 1926.7	5
Limonene		-	-	-
Total yield				0.75%

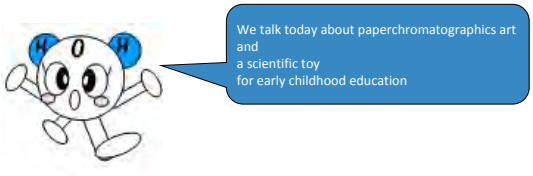
4.Discussion

The yield of obtained essential oil by HD was 0.75% (v/w) while the yields of *A. santolina* L. essential oil from Egypt, Algeria and Iran were reported 0.49%, 0.99%, and 0.60% respectively. it was found that this plant has less amount of essential oil.

- ✓borneol: Egypt (1.7%), Algeria (0.22%) and Iran (3.93%)
- ✓β-pinene: Egypt (0.2%), Iran (0.31%), Algeria (1.06%) and Jordan (0.35%)

Outreach Activity in Science

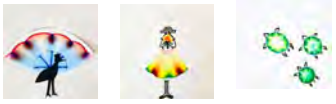
Nanako KAWANO and Shoko TANAKA
ESCO
(Environmental Science Club of Ochanomizu University)
https://ochakan.1net.jp



Paperchromatographics Art

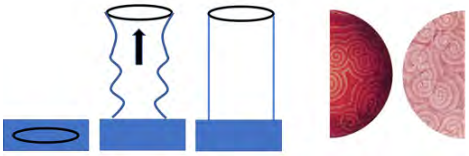
KAWANO Nanako

ABSTRACT
The science-based art production has been performed and the products are Exhibited on a SNS, Instagram. The searching function of the SNS, hash-tag, is used for artists to attract much attention on it

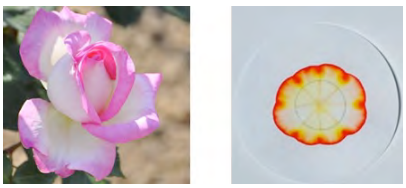


Typical patterns in the nature of striped and dotted with periodicity

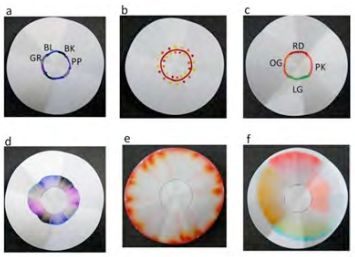
Periodic patterns in a laboratory are produced based-on a scientific principle



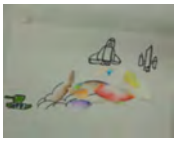
Another is staining in the nature or a laboratory



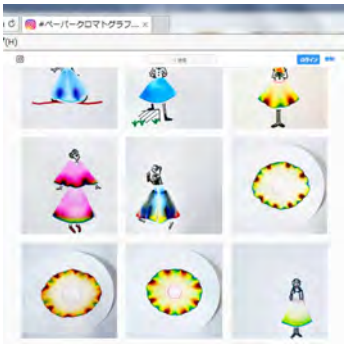
Paperchromatographics produces staining patterns with ink-pens, a paper and water



Pieces of the stained paper are used for making an image



The Instagram hash-tag function is used for artists to attract much attention on it.



Let`s go search with #paperchromatographics

A Scientific Toy for Early Childhood Education

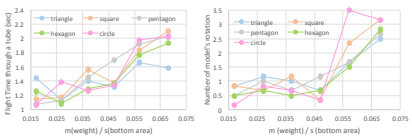
Shoko Tanaka

ABSTRACT

Flight models made of aluminum foil were examined in a flight tube. The tube was made of a PVC sheet and raising flow was prepared with a room circulator. Flight behavior was depend on form and size of the models.

Flight tube

Flight models



Each shape has own value about time and number of rotation , but they have similar trend on a ratio of weight to bottom area.

Closing Remarks

Session Chair Closing Remarks (Japan)

Yumiko NAGOH
Project Manager, Institute for Open Innovation,
The University of Tokyo
Vice President of 3 NPOs(JNWES, GSTEM-CPP, ReSDA)

Education

Degree: BE, Description: Chemical Engineering, The University of Tokyo, Location: Japan, Year: 1984
Degree: ME, Description: Chemical Engineering, The University of Tokyo, Location: Japan, Year: 1986

Research Field

Environmental pollution, Surfactant, Washing mechanism

Career History

Since joining Lion Corp. in 1986, she worked as a researcher of process engineering and detergent development for 18 years. She was awarded President award with the theme of development of new life proposal detergent “Heyaboshi-TOP”. After she worked in market research and product planning department for 6 years, she started her new career for public relations division in The University of Tokyo. Recently, she supports Chance Discovery Labs. as a project manager in Institute for Open Innovation. Also she is dedicating to NPO or volunteer activities for next generation, science education, revitalization of senior generation and regional activation.

Civic, Political, and Philanthropic Activities

She has been a leader of mentoring subcommittee at Japan Womens Engineers Forum(JWEF), a 20-year member. Various kinds of career support activities are reported on JWEF website(http://jwef.jp/) for a wide range of age groups, from elementary school students to seniors. She serves as vice president at three NPOs, JNWES, STEM Career Path Project for Girls(GSTEM-CPP) and Relife Social Design Association(ReSDA). Since 2018 she is also involved in a regional revitalization project for the Takatsu River basin in Shimane Prefecture.

Closing Remarks (Japan)

Fusako UTSUMI
President of National Women's Education Center（NWEC）

Education

1971 graduated from the Department of Mathematics, Tsuda University

Career History

Since joining NEC in 1971, she worked as a Software Development Engineer and was appointed a manager of the Engineering departments. In 1989 she had begun to engage in development of female workers of the company when she was transferred to the Personnel Department. Since then she had undertaken the management of personnel, labor and human resources. In 2001 she was appointed Managing Officer of the Personnel Department of NEC Soft, Ltd. and assumed a presidency of NEC Learning Ltd. in 2005. In 2011, she was appointed as a president of National Women's Education Center (NWEC). As a first president from private sector assuming the position, she has been expanding the boundaries of the organization including promotion of gender equality and diversity in the workplace and launching new programs for young women.

Achievements

She is the author of *"*Watashi wa Jinji Kacho Ichinensei*" (I'm a First Year HR Manager), Keidanren Publications* 1990 and *"*Motto Suteki ni Working Life*" (How to Better Enjoy your Working Life), Daiwa Shuppan* 1993.

Civic, Political, and Philanthropic Activities

Auditor, Ochanomizu University (2016 –)
Administrative Council Member, Saitama University (2014 –)
Advisor, The Tokyo Organising Committee of the Olympic and Paralympic Games (2014 –)

Current Memberships

Japanese Society for Engineering Education (Chair of Diversity Working Group, 2008 –)
Japan Society of Educational Information (Board Member 2011–)

The 9th JCK-WLF Photos

Hisao & Hiroko TAKI PLAZA

お茶の水女子大学
Ochanomizu University

20191010-12 Tokyo JAPAN

The 9th JCK-WLF Photos

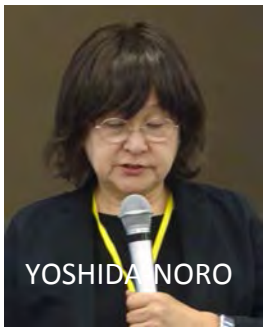
Haneda Airport

Welcome Dinner @ Sunshine Prince Hotel

20191010 Tokyo JAPAN

The 9th JCK-WLF Photos

Opening



Session 1

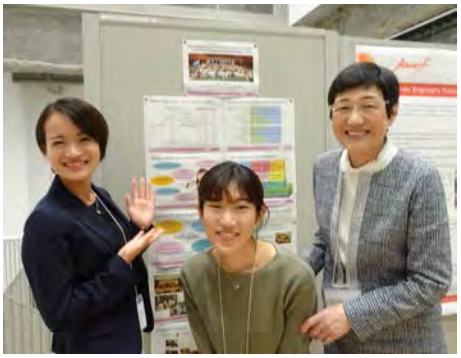
Session 2

Forum@ Ochanomizu Univ.

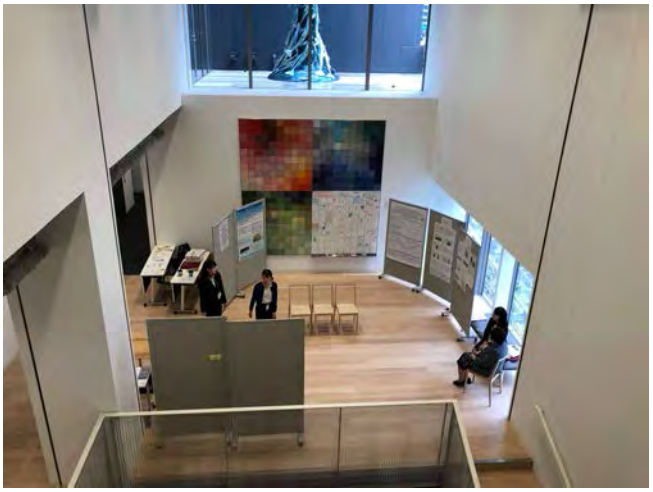
20191011 Tokyo JAPAN

The 9th JCK-WLF Photos

Session 3



Poster Session



Closing

Forum@ Ochanomizu Univ.

20191011 Tokyo JAPAN

The 9th JCK-WLF Photos

Tea Break

Lunch

Banquet @ Ochanomizu Univ.

20191011 Tokyo JAPAN

The 9th Japan Korea China Women Leaders Forum for Science & Technology

第9回日中韓女性科学技術指導者フォーラム

Gender Equality for Sustainable Development Goals

持続可能な開発目標がめざすジェンダー平等

9:00-17:00, Friday, October 11, 2019　Ochanomizu University

2019年10月11日（金）9:00-17:00　お茶の水女子大学　国際交流留学生プラザ

Opening Ceremony

Session Chair: Hitomi Kumagai, CBS, Nihon Univ. Next President of EPMEWSE

Message from MEXT	Akira Kusume
Chair of EPMEWSE	Mihoko Nojiri, KEK
President of JNWES	Ryo Kimura, Sakae Design
President of KOFWST	Myeong-Hee Yu, KIST
Head of CWAST Delegation	Jihong Yu Prof. Jilin University, CAS
President of Ochanomizu Univ.	Kimiko Murofushi

Session 1: Evaluation Systems for Gender Equality Activities

ジェンダー平等度評価システム

Session Chair: Mei Tian, Prof. Deputy Director, Zhejiang Univ. Medical Center

Japan　Chikako Yoshida-Noro, CIT, Nihon Univ. & Yasuko Sasaki, Ochanomizu Univ.

Korea　So Young Kim, Grad. Sch. of Science & Technology Policy at KAIST

China　Ruomei Li, Former Secretary-General, CSEE

Session 2: Career Development Programs for Next Generations

次世代キャリア開発プログラム

Session Chair: Heisook Lee, GISTeR, KOFWST, Ewha Womans Univ.

Japan　Rie Yamaguchi, JWEF

Korea　Suk Kyeong Lee, The Catholic Univ. of Korea, School of Medicine.

China　Erfan Ju, Senior Engineer, Director, GE Toshiba Silicones, Great China

Session 3: Role of Chemistry for SDGs

持続社会のための化学の役割

Session Chair: Akiko Itakura, Group Leader, NIMS

Japan　Maki Kawai, President of Chem. Soc. Japan, Direct. Gen. Inst. Mol. Sci.

Korea　Heesun Chung, Dean, Prof. GRAST, Chungnam National Univ.

China　Zhimin Liu, Prof. The Institute of Chemistry, CAS

Poster Session

Coordinators: Eiko Nakayama, Showa Women's Univ.,
Yoshihito Mori, Ochanomizu Univ., Maki Iwakuma, P.E. Jp

Closing Remarks

Session Chair: Yumiko Nagoh, Univ. Tokyo

President of NWEC　Fusako Utsumi

Banquet at Ochanomizu University

JNWES Japan Network of Women Engineers and Scientists 特定非営利活動法人日本女性技術者科学者ネットワーク

EPMEWSE

お茶の水女子大学 Ochanomizu University

JST Japan Science and Technology Agency

男女共同参画学協会連絡会

MEXT MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

独立行政法人 国立女性教育会館 National Women's Education Center NWEC