

ITS-IFToMM / K-TIS 2017

**4th International Tribology
Symposium of IFToMM** (ITS-IFToMM 2017)

**1st Korea-Tribology
International Symposium** (K-TIS 2017)



Program Book

March 19^{SUN} ~ 22^{Wed}, 2017 Ramada Plaza Hotel, Jeju, Korea



The Korean Society of Tribologists &
Lubrication Engineers (KSTLE)



IFToMM

IFToMM Technical Committee for Tribology

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Welcome Message

On the behalf of the 2017 IFToMM organizing committees, I am honored and delighted to welcome you to the 4th International Tribology Symposium of IFToMM & 1st Korea Tribology International Symposium at Jeju, Korea.

In this conference, delegates from 20 countries including Korea are scheduled to attend. In technical program, 6 keynote speeches, 10 invited talks, 198 technical papers, and symposiums for lubricants are contained. We expect the opportunity for scientists and engineers from all over the world to gather and exchange the latest information on a wide range of topics that are relevant to the discipline of tribology.

I sincerely hope this symposium will become a chance to promote international cooperation and ultimately boost the global level of tribology technology. And I also truly believe that the conference will provide an excellent opportunity to observe recent trend and share innovative ideas.

Finally, I thank local organizing committees for planning programs and also industrial members for the financial support to the IFToMM symposium. In addition, I hope you enjoy a great time in fabulously beautiful attraction place, Jeju Island.

Thank you very much.



Dr. Ung Su Choi,
Chair of ITS-IFToMM /
K-TIS 2017

Welcome Message

Welcome all of you, the speakers, presenters, and participants to the 4th International Tribology Symposium of IFToMM & 1st Korea Tribology International Symposium at Jeju, the beautiful volcanic island with Halla Mountain. Jeju island now become a treasure island of environmental assets that the world has to preserve.

Tribology still holds very important parts in Korean Economy. The research and developments related with tribology become very popular to the public and also to the design engineers, who really want to avoid and control the friction, wear, and lubrication. Even though the funding for the research is not enough, we try to generate more impact on society and technology in order to sustain and increase its momentum.

I would like to thank all committee member for their dedication and hard work. I would also like thank Korea Lubricating Oil Industries Association for its generosity in sponsoring the conference. And also I thank to many KSTLE group members and members for supporting and participating the meeting. Finally, I hope all participants enjoy a great time in Jeju Island.



Prof. Young-Ze Lee,
President of KSTLE

It is indeed my great pleasure and honor to welcome all of you to ITS-IFToMM/K-TIS 2017. This event is particularly meaningful as it is a joint symposium of the 4th International Tribology Symposium of IFToMM and the 1st K-Tribology International Symposium. IFToMM, which stands for International Federation for the Promotion of Mechanism and Machine Science, is an international academic organization with a history of about 50 years. It was initially founded with the aim to foster scientific cooperation among countries with political differences during the Cold War period. Now, it has grown to be a global academic organization with 48 member countries and 13 Technical Committees.

This is the 4th International Tribology Symposium of IFToMM organized by the Tribology Technical Committee, following the 2008 Beijing, 2010 Rio de Janeiro and 2013 Lulea International Tribology Symposium of IFToMM. I am delighted that the this symposium participants have come from 20 countries around the globe to share the latest information in tribology research and development. I am confident that the knowledge disseminated through this symposium will ultimately aid in providing better technologies to the society where energy and resource conservation issues are becoming ever more important.

Finally, I would like to express my gratitude to all the participants and everyone who was involved in organizing this event. I am also grateful to the sponsor organizations for their generous contributions which made this symposium possible. I hope that the pioneering spirits of the founders of IFToMM will prevail throughout this symposium and all of you will have a memorable time in this beautiful island of Jeju!



Prof. Dae-Eun Kim,

Chair of Organizing Committee, ITS-IFToMM/K-TIS 2017

Chair of IFToMM Technical Committee for Tribology

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General Secretary

Kwon Yong Lee, Sejong Univ.
Choong Hyun Kim, KIST
Dae Yeon Kim, Hankook Shell Oil Ltd.

Speakers

Keynote Speakers



Dr. Ali Erdemir

Mar 20 (Mon) 09:15-10:00

*Distinguished Fellow and Senior Scientist,
Argonne National Laboratory, U.S.A*

**Title: How to Deal with Friction and Its Adverse Impact on
Energy and Environment: A 21st Century Dilemma**



Prof. Takahisa Kato

Mar 21 (Tue) 15:30-16:15

*President of Japanese Society of Tribologists
Department of Mechanical Engineering,
The University of Tokyo, Japan*

**Title: Friction Fade-out at Hydrogen-rich DLC Film Slid by ZrO₂
Pins Under Heavy Applied Load**



Dr. HongWook Lee

Mar 20 (Mon) 10:00-10:45

*Research Fellow, Engine Tribology Research Lab,
Hyundai Motor Group, Korea*

Title: Tribology in Automotive Engine Applications



Prof. Jianbin Luo

Mar 21 (Tue) 11:30-12:15

*Changjiang Scholar Distinguished Professor
Head of Department of Mechanical Engineering,
Tsinghua University, China*

Title: Advances of Superlubricity

Keynote Speakers



Prof. Nikolai Myshkin

Mar 21 (Tue) 10:45-11:30

Director of Metal-Polymer Research Institute of National Academy of Sciences of Belarus, Belarus

Title: Tribology of Polymer Composites and Nanocomposites



Prof. Valentin L. Popov

Mar 21 (Tue) 16:15-17:00

Head of Department of System Dynamics and the Physics of Friction, Technische Universität Berlin, Germany

Title: Method of Dimensionality Reduction and Boundary Element Method: Foundations and Applications in Contact Mechanics and Tribology

Invited Speakers



Prof. Koshi Adachi

Mar 21 (Tue) 09:00-09:30

Department of Mechanical Systems Engineering, Tohoku University, Japan

Title: Running-in Control for Creation of Nanointerface for Super-low Friction



Prof. Hyo-Sok Ahn

Mar 22 (Wed) 09:00-09:30

Manufacturing System and Design Engineering Programme, Seoul National Univ. of Science & Technology, Korea

Title: Scratch Test for Coatings and Thin Films

Speakers

Invited Speakers



Prof. Ho Jang

Mar 20 (Mon) 13:45-14:15

*Department of Materials Science and Engineering,
Korea University, Korea*

Title: Triggering Mechanism for Friction Induced Vibrations



Prof. Yeau-Ren Jeng

Mar 22 (Wed) 09:00-09:30

*Endowed Chair Professor, National Chung Cheng University,
Taiwan*

Title: Probe the Genesis of Tribology using In-situ Technique



Prof. Zhongmin Jin

Mar 21 (Tue) 09:00-09:30

*Distinguished Professor, Southwest Jiaotong University
Visiting Professor at Xian Jiaotong University, China
Leeds University, U.K.*

**Title: Latest Developments of Biotribology Research of Artificial
Joints**



Prof. Satish V. Kailas

Mar 22 (Wed) 09:00-09:30

*Department of Mechanical Engineering,
Indian Institute of Science, India*

Title: Closing the Loop and Eco-friendly Tribology Products

Invited Speakers

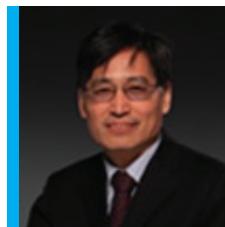


Prof. Hakan Kaleli

Mar 20 (Mon) 11:00-11:30

*Faculty of Mechanical Engineering,
Yildiz Technical University, Turkey*

**Title: Characterization of Graphene Nanoparticles in the Oil
in terms of Friction and Wear for Internal Combustion
Engine's Piston Ring/Cylinder Liner**



Prof. Yonggang Meng

Mar 20 (Mon) 16:45-17:15

*Director of State Key Laboratory of Tribology
Department of Mechanical Engineering,
Tsinghua University, China*

**Title: Simulation and Control of Running-in Process during
Sliding Friction**



Prof. Noritsugu Umebara

Mar 20 (Mon) 11:00-11:30

*Vice Dean and Professor, Graduate School of Engineering,
Nagoya University, Japan*

**Title: In-situ Observation of Sliding Surface of Carbonaceous
Hard Coatings with Reflectance Spectroscopy**



Prof. Junyan Zhang

Mar 21 (Tue) 13:45-14:15

*Deputy Director, Center of Advanced Lubricating and Protecting
Materials
Lanzhou Institute of Chemical Physics,
Chinese Academy of Sciences, China*

Title: Engineering Applicable Solid Superlubricity

Program at a Glance

March 19 SUN	Time	March 20 MON
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March 21 TUE		Time	March 22 WED		
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Session Timetable

DAY 1 - March 20 MON

Keynote Talk I , II		09:15 ~ 10:45	Ball Room 1
Chair	Dae-Eun Kim, <i>Yonsei University, Korea</i>		
160520	How to Deal with Friction and Its Adverse Impact on Energy and Environment: A 21st Century Dilemma Ali Erdemir , <i>Distinguished Fellow and Senior Scientist / Argonne National Laboratory, U.S.A</i>		
160511	Tribology in Automotive Engine Applications Hong Wook Lee , <i>Research Fellow, Engine Tribology Research Lab / Hyundai Motor Group, Korea</i>		
Oral Presentation I			
M11	Tribo-chemistry and Lubricants 1		11:00 ~ 12:15
Chair	Thummalapalli C S M Gupta , <i>Apar industry, India</i> Tae Wan Kim , <i>Pukyong National University, Korea</i>		Ball Room 2
M11-1 160458	Characterization of Graphene Nanoparticles in the Oil in terms of Friction and Wear for Internal Combustion Engine's Piston Ring/Cylinder Liner Kaleli Hakan , <i>YILDIZ Technical University, Turkey</i> Saner Okan Burcu , <i>Sabanci University, Turkey</i>		
M11-2 160423	Self-Lubricating Al-WS ₂ Composites for Efficient and Green Tribological Parts Vlad Bogdan Niste , <i>Kyushu University, Japan</i> Monica Ratoi , <i>University of Southampton, UK</i> Hiroyoshi Tanaka , <i>Kyushu University, Japan</i> Fang Xu, Yanqiu Zhu , <i>University of Exeter, UK</i> Joichi Sugimura , <i>Kyushu University, Japan</i>		
M11-3 160344	Evaluation of Tribological Properties of Micronized PTFE Powders as Performance Additives in Greases Thummalapalli C S M Gupta, Babu Prasad Kodukula, Banti Sidhwala, Vinita Shinde, Kalyani Gawhale , <i>Apar industries Limited, India</i>		
M12	Lubrication 1		11:00 ~ 12:15
Chair	Andrea Trivella , <i>Politecnico di Torino, Italy</i> Keun Ryu , <i>Hanyang University, Korea</i>		Ball Room 3
M12-1 160317	On the Relevance of Analytical EHD Equations for Predicting Film Thickness in Isothermal Point Contacts Jean-David Wheeler, Philippe Vergne, Nicolas Fillot, David Philippon , <i>Univ Lyon, INSA Lyon, France</i>		
M12-2 160270	A New Application of Spiral Groove in Reciprocating Fuel Pump for Medium-Speed Diesel Engines Sung-Ho Hong , <i>Dongguk University-Gyeongju, Korea</i> Bora Lee , <i>Pusan National University, Korea</i> Wooju Jeon , <i>Korea Institute of Science and Technology, Korea</i>		
M12-3 160342	Theoretical Prediction of the PV Parameter for Carbon Floating Ring Seals Mihai Arghir , <i>Institut PPRIME, Universite de Poitiers, France</i>		

DAY 1 - March 20 MON

M12-4 160432	Performance of Hydrostatic Journal Symmetric/Asymmetric Bearings Using Slot-Entry Restrictor under Couple Stress Lubricants Nathi Ram , <i>Indira Gandhi Delhi Technical University For Women, India</i> Saurabh Kumar Yadav , <i>Graphic Era University, India</i> Satish C Sharma , <i>Indian Institute of Technology Roorkee, India</i>		
M12-5 160300	Lubrication Properties of Copper Molybdate and Silver Molybdate Powders at High Temperature Yoshinori Takeichi, Takatoshi Nakamura , <i>Toyohashi University of Technology, Japan</i> Masahiro Kawamura , <i>Kawamura Research Laboratory Co., Ltd, Japan</i> Marian Dzimko , <i>University of Zilina, Slovakia</i>		
M13	Coatings and Thin Films 1	11:00 ~ 12:15	Ball Room 4
Chair	Auezhan Amanov , <i>Sun Moon University, Korea</i> Young Jun Jang , <i>Korea Institute of Materials Science, Korea</i>		
M13-1 160443	In-Situ Observation of Sliding Surface of Carbonaceous Hard Coatings with Reflectance Spectroscopy Noritsugu Umebara, Hidenori Nishimura , <i>Nagoya University, Japan</i>		
M13-2 160297	Tribological Properties of Graphene Oxide Composite Coating Narguess Nemati , <i>Yonsei university, Korea</i> Massoud Emamy , <i>University of Tehran, Iran, Islamic Republic of</i> Dae-Eun Kim , <i>Yonsei university, Korea</i>		
M13-3 160287	Surface Properties and Tribological Characteristics of Collagen Coating Chang-Lae Kim, Dae-Eun Kim , <i>Yonsei University, Korea</i>		
M13-4 160293	Study on the Friction Properties of a-C:H Films in a Microstructural Point of View Takumi Ishikawa, Junho Choi , <i>The University of Tokyo, Japan</i>		
M14	Automotive Tribology 1	11:00 ~ 12:15	Ball Room 5
Chair	Alexander Fidlin , <i>Karlsruhe Institute of Technology, Germany</i> Koo-Hyun Chung , <i>University of Ulsan, Korea</i>		
M14-1 160298	Friction Properties of Plastics with Textured Surface against Steel under Reciprocating Sliding with Grease Lubrication Manabu Suzuki , <i>Toyohashi University of Technology, Japan</i> Ryo Morita, Ken Arakawa , <i>SOMIC ISHIKAWA inc., Japan</i> Daichi Takahashi, Taichi Sasaki, Tatsuya Ito, Yoshinori Takeichi , <i>Toyohashi University of Technology, Japan</i>		
M14-2 160340	Effects of Solid Lubricants (Graphite, MoS ₂ and Sb ₂ S ₃) of Cu/SiC Hybrid Composite Brake Materials on Tribological Properties for Medium Duty Automotive Applications Raja Petchiappan, Ramkumar Penchalaiah , <i>Indian Institute of Technology Madras (IITM), India</i>		
M14-3 160322	The Effect of Contact Plateaus on Stick-Slip Profiles of the Brake Friction Material Byungsoo Joo, Jinwoo Kim, Sangmok Lee, Ho Jang , <i>Korea University, Korea</i>		
M14-4 160407	Porosity Effects on Tribological and Mechanical Properties of Sintered-Tempered Cu-Based Matrix Materials for Brake Applications Glenn Kwabena Gyimah, Zhongning Guo , <i>Guangdong University of Technology, China</i> Shuzhen Jiang , <i>Guangdong University of Technology, China</i> Ping Huang, Dong Chen , <i>South China University of Technology, China</i> Gary C Barber , <i>Oakland University, United States</i>		
M14-5 160504	The Change of Functional Property of Engine Oil by Diesel Fuel Mixing Young-Kwan Lim, Jong-Eun Lee, Jong-Ryeol Kim, Jong-Han Ha , <i>Korea Petroleum Quality & Distribution Authority, Korea</i>		

Session Timetable

DAY 1 - March 20 MON

Oral Presentation II

M21	Tribo-chemistry and Lubricants 2	13:45 ~ 15:00	Ball Room 2
Chair	Vlad Bogdan Niste, Kyushu University, Japan Sang Keun Kim, TAEHOTECH. Solution, Korea		
M21-1 160345	Tribological Behaviour of Carbon Nano Tubes as Lubricant Additive in Boundary Lubrication Ramkumar Penchalaiah, Gnana Saurya Vankayalapati, Indian Institute of Technology Madras (IITM), India		
M21-2 160375	Study on Tribological Characteristics of Lubricant Applied to Waterjet Lubrication System Hyekyung Yoon, Younghye Kim, Wonoh Cho, CALS Corp., Korea		
M21-3 160268	Solid Lubricant of FeS : A Possible Alternative to MoS ₂ for Cu-Fe Based Friction Materials Tao Peng, Qingzhi Yan, Xiaojiao Shi, Fei-xiong Wang, University of Science and Technology Beijing, China		
M21-4 160326	Research on Tribological Properties of Ball-Milled Reduced Graphene Oxide Nanosheets as Oil Additives Junyuan Mao, Yongyong He, Jun Zhao, Tsinghua University, China		
M21-5 160352	Compound and Characteristics of the Optimum Bearing Greases Sang Keun Kim, TAEHOTECH. Solution Corp., Korea		
M22	Lubrication 2	13:45 ~ 15:00	Ball Room 3
Chair	Mihai Arghir, Universite de Poitiers, France Yongbok Lee, Korea Institute of Science and Technology, Korea		
M22-1 160279	The Influence of Bearing Configuration on the Transient Characteristics of Water Lubricated Bearing Tianming Ren, Ming Feng, University of Science and Technology Beijing, China		
M22-2 160351	Hydro-Power Application Cylindrical Turbine Guide Bearings having Pad Leading-Edge Tapers - Effects of Taper Angle and Length An Sung Lee, Korea Inst. of Machinery & Materials (KIMM), Korea Sun-Yong Jang, Daedong Metal Industry Co. Ltd. (DMB), Korea		
M22-3 160315	Surface Finish and Phosphonium Ionic Liquid Additive to Postpone Scuffing during Starved Lubrication in High Speed Gears Stephen Berkebile, Kevin Radil, Nikhil Murthy, Mark Riggs, US Army Research Laboratory, USA		
M22-4 160281	Thermal Effects on the Performance of a Tilting Pad Journal Bearing Syed Muntazir Mehdi, Kyung Eun Jang, Tae Ho Kim, Kookmin University, Korea		
M22-5 160512	Hydrostatic Jacking Model for Tilting Pad Journal Bearings Sung Yun Jeong, Kyung Eun Jang, Tae Ho Kim, Kookmin University, Korea		

DAY 1 - March 20 MON

M23	Coatings and Thin Films 2	13:45 ~ 15:00	Ball Room 4
Chair	Narguess Nemati , <i>Yonsei University, Korea</i> Tae Gyu Kim , <i>Pusan National University, Korea</i>		
M23-1 160395	The Effect of WS ₂ Nanopowder Added Lubricant on Friction and Wear of ta-C Coating Films Chin Ean Yeoh, Seock-Sam Kim , <i>Universiti Malaysia Sabah, Malaysia</i> Jong-Hyoung Kim, Si Geun Choi , <i>Korea Institute of Industrial Technology, Korea</i> Willey Yun Hsien Liew, Nancy Julius Siambun , <i>Universiti Malaysia Sabah, Malaysia</i>		
M23-2 160314	Sliding Wear Behavior of Mild Steel Carburized Using Na ₂ CO ₃ -NaCl Willey Yun Hsien Liew, Jester L.J. Ling, Nancy Julius Siambun <i>Universiti Malaysia Sabah, Malaysia</i>		
M23-3 160388	Effect of Arc-Current and Spray Distance on Elastic Modulus and Fracture Toughness of Plasma Sprayed Chromium Oxide Coatings Simanchal Kar, Partha Pratim Bandopadhyay, Soumitra Paul <i>Indian Institute of Technology Kharagpur, India</i>		
M24	Automotive Tribology 2	13:45 ~ 15:00	Ball Room 5
Chair	Glenn Kwabena Gyimah , <i>Guangdong University of Technology, China</i> Minhaeng Cho , <i>Chung-Ang University, Korea</i>		
M24-1 160463	Triggering Mechanism of Friction Induced Vibrations Jang Ho , <i>Korea University, Korea</i>		
M24-2 160307	Experimental Approach to Measure the Permeability of a Tribo-Contact in Dry Friction Clutches Alexander Fidlin, Georg Jehle, Harry Clausnizer , <i>Karlsruhe Institute of Technology, Germany</i>		
M24-3 160367	An Optimal Design of Cross-Hatched Texture on Cylinder Liner by Response Surface Methodology Yang Hu, Xianghui Meng, Youbai Xie , <i>Shanghai Jiaotong University, China</i>		
M24-4 160280	Influence of Sliding Distance on Wear Depth of Hybrid Al 6082-SiC-Gr Composites under High Stress Abrasion N. Ch. Kaushik, R.N. Rao , <i>National Institute of Technology Warangal, India</i>		

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Oral Presentation III

M31	Tribo-chemistry and Lubricants 3	16:45 ~ 18:00	Ball Room 2
Chair	Janet Wong , Imperial College London, UK Sang-Shin Park , Yeungnam University, Korea		
M31-1 160305	Highly Exfoliated Reduced Graphite Oxide Using as Efficient Lubricant Oil Additives Jun Zhao, Junyuan Mao, Yongyong He, Jianbin Luo, Yingru Li , Tsinghua University, China		
M31-2 160389	The Anti-Wear Properties of GNP Nanoparticles in Blended Polyalphaolefins and Palm Oil TMP Ester Zakaria muhammad bin Zulfattah , Universiti Teknikal Malaysia Melaka, Malaysia Haji Hassan Masjuki, Siti Safiyah Nor Azman, A.K. Adeeb, Nurin Wahidah Mohd Zulkifli , University of Malaya, Malaysia		
M31-3 160457	Thermophysical Properties of MoS ₂ Based Graphene Nanolubricant Rashmi Walvekar , Taylor's University, Malaysia Mohammad Khalid Siddiqui , University of Nottingham, Malaysia Kelly Lee , Taylor's University, Malaysia Thummalapalli C S M Gupta , APAR Industries Limited, India		
M31-4 160379	How Lubricant Flows in an Elastohydrodynamic (EHD) Contact Janet Wong, Stephen Jeffreys, Benedicte Galmiche , Imperial College London, UK		
M31-5 160451	Origin of Shear Banding of Elastohydrodynamic Lubricants Luca di Mare, Benedicte Galmiche, Janet Wong , Imperial College London, UK		
M32	Lubrication 3	16:45 ~ 18:00	Ball Room 3
Chair	Stephen Berkebile , US ARL, USA Sung-Ho Hong , Dongguk University, Korea		
M32-1 160383	Experimental Study of Mixed Friction Property of Rubbers for Lip Seals Shigenobu Honda , NOK Corporation, Japan Joichi Sugimura , Kyushu University, Japan		
M32-2 160431	Dynamic Behaviour of a Semi-Active Air Thrust Bearing Andrea Trivella, Danial Ghodsiyeh, Federico Colombo, Terenziano Raparelli, Vladimir Viktorov , Politecnico di Torino, Italy		
M32-3 160468	Analysis of Elastohydrodynamic Lubricated Contacts of Quarter-Space P L Patrick Wong, L. Guo , City University of Hong Kong, Hong Kong W. Wang, Z. M. Zhang , Shanghai University, China		
M32-4 160400	Tribological Performance of Piston Ring-Cylinder Liner System with Surface Texture Yanjun Lu, Cheng Liu, Yongfang Zhang, Sha Li , Xi'an University of Technology, China		

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M33	Coatings and Thin Films 3	16:45 ~ 18:00	Ball Room 4
Chair	Mohd Fadzli Bin Abdollah , Universiti Teknikal Malaysia Melaka, Malaysia Young Hun Chae , Kyungpook National University, Korea		
M33-1 160267	Tribological Behavior of a Ti6Al4V Alloy Sliding against a PEO-Coated Ti6Al4V Alloy over a Wide Range of Sliding Conditions Mathieu Marquer , Université de Lorraine/IRT M2P, France Andrea Cappella , Sylvain Philippon , Pierre Chevrier , Université de Lorraine, France Joffrey Tardelli , IRT M2P, France Karim Demmou , Safran Aircraft Engines, France		
M33-2 160396	Nitrogen Doped Amorphous Hydrogenated Carbon Thin Films Deposited on Stainless Steel Using High Energy Plasma Focus Device Ammar Ghorbani , University of Guilan / Nuclear science and Technology Research Institute, Iran Asghar Sadighzadeh , Nuclear Science and Technology Research Institute, Iran Majid Seifi , University of Guilan, Iran Seyed Mahmood Sadatkhiai , Amir Raeisdana , Nuclear Science and Technology Research Institute, Iran Narguess Nemati , Yunesi University, Korea		
M33-3 160330	The Effect of Substrate Bias Voltage on the Adhesion Strength of ta-C Coated Tools Prepare by Filtered Cathode Vacuum Arc Young-Jun Jang , Jongkuk Kim , Korea Institute of Materials Science (KIMS), Korea		
M33-4 160419	Tribochemistry at the Sliding Interface of Carbon Nitride Coatings for the Superlubricity under Ultra-dry Nitrogen Atmosphere Naohiro Yamada , Takanori Takeno , Koshi Adachi , Tohoku University, Japan		
M33-5 160368	Wear Failure Analysis of Oil Palm Fiber-Epoxy Composite Mohd Fadzli Bin Abdollah , Fairuz Fazilah Shuhimi , Hilmi Amiruddin , Universiti Teknikal Malaysia Melaka, Malaysia M.A. Kalam , M. Hassan , University of Malaya, Malaysia		
M34	Fundamentals of Friction and Wear 1	16:45 ~ 18:00	Ball Room 5
Chair	Alan Hase , Saitama Institute of Technology, Japan Bo Zhang , Saga University, Japan		
M34-1 160441	Modeling of Running-in Process of Sliding Concentrated Contacts under Mixed Lubrication Conditions Yonggang Meng , Yazhao Zhang , Hui Cao , Tsinghua University, China		
M34-2 160337	Modulation of the Lubricity of Mucins by Complexation with Polymers Seunghwan Lee , Nikolaos Nikogeorgos , Technical University of Denmark, Denmark Navinkumar Patil , Bruno Zappone, Università della Calabria, Italy		
M34-3 160401	Adjustment of Friction in Polymer-Polymer Sliding Tuula T. Pakkanen , Adil Chaudri , Mika Suvanto , University of Eastern Finland, Finland		

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Poster session

P1	15:15 ~ 16:45 Ball Room Lobby
Chair	Hyunseop Lee , Tongmyong University, Korea Hung-Gu Han , Korea Institute of Science and Technology (KIST), Korea
P1-1 160271	The Study of Tribological Property, Electrochemical Behavior and Biocompatibility of Plasma Nitrided and Deposited TiN on AISI 316L Stainless Steel Wen Hsien Kao , Chienkuo Technology, Taiwan Y. T. Hsieh , National Cheng Kung University, Taiwan
P1-2 160275	Fabrication and Tribocorrosion Behavior of Multilayered Cr/GLC Films Used for Marine Environment Li Lei, Linlin Liu , Ningbo Institute of Materials Technology and Engineering / University of Chinese Academy of Science, China Xiaowei Li, Peiting Ke, Wang Ai Ying , Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences / University of Chinese Academy of Science, China
P1-3 160277	CFD Analysis of Bearing Slider with Dimples Sung-Ho Hong , Dongguk University - Gyeongju, Korea Hong-Gyu Jeon, Jae-Hyeong Yoo , Hyundai Heavy Industries, Korea
P1-4 160278	Effects of the Relative Amounts of Imide, Amine and Salts Forms of Dispersants Prepared from Poly[Isobutylene Succinic Anhydride] on the Dispersion of Asphaltenes in Heavy Crude Oils Sang-Jun Lee, Jihoon Shin, Young-Wun Kim , Korea Research Institute of Chemical Technology, Korea Youngdo Yang , EMAX Solutions Co., Korea
P1-5 160291	Surface Protective Coating for Polymer Substrates Mahdi Khadem, Tae Lim Park, Dae-Eun Kim , Yonsei University, Korea
P1-6 160292	Tribological Property of Epoxy with Respect to Sliding Condition Byung Kook Kim, Ming Yu Gao, Dae-Eun Kim , Yonsei University, Korea
P1-7 160301	Electrorheological Behavior of Modified Polyacrylonitrile Homopolymer Particle Dispersed Silicone Oil Suspension Taegu Do , Korea Institute of Science and Technology (KIST) / University of Science & Technology (UST), Korea Ung Su Choi , Korea Institute of Science and Technology (KIST), Korea
P1-8 160306	Soft-EHL Line Contacts on Finite Thickness Qie-Da Chen , National Cheng Kung University, Taiwan Shun-Ching Lee National Kaohsiung University of Applied Science, Taiwan, Wang-Long Li National Cheng Kung University, Taiwan
P1-9 160308	Scratch Behavior of ZrO ₂ Thin Films Prepared by Atomic Layer Deposition Method on Silicon Wafer Si Hwan Kim, Hyo-Sok Ahn , Seoul National University of Science and Technology, Korea
P1-10 160309	Tribological Properties of Single-Layer Graphene Chanhyung Park, Juhee Kim, Hyo-Sok Ahn Seoul National University of Science and Technology, Korea
P1-11 160311	Analysis of Friction Mechanisms associated with Write Feeling JinHwak Park, Min-Seob Kim, JaeHyuk Lee, Young-Ze Lee , SungKyunKwan University, Korea

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P1-12 160313	Effect of the Deacetylation Degree of Natural Polymer Dispersed Oil-Suspension on the Electrorheological and Electrical Properties Youngkyun Jung, Taegu Do , <i>University of Science & Technology (UST), Korea</i> Youngsang Chun , <i>Korea Institute of Science and Technology (KIST) / College of Engineering, Korea University, Korea</i> Ung Su Choi , <i>Korea Institute of Science and Technology (KIST), Korea</i>
P1-13 160318	Electrorheological Property of Alginic Acid and Ion Alginate Suspension under Electric Field Youngsang Chun , <i>Korea Institute of Science and Technology (KIST) / University of Science and Technology (UST), Korea</i> Ung Su Choi , <i>Korea Institute of Science and Technology (KIST), Korea</i> SeungWook Kim , <i>Korea University, Korea</i>
P1-14 160327	Effect of Applied Pressure on Delamination of SU-8 Film in CMP Process Hyunseop Lee , <i>Tongmyong University, Korea</i> Dasol Lee, Sunjoon Park , <i>Pusan National University, Korea</i>
P1-15 160334	Enhancement of Anti-Wear Property of Steel Roll Wiper Blade Jake Yoo, Sook Lee , <i>Yoo Won Co., LTD, Korea</i> Hung-gu Han, Hosung Kong , <i>Korea Institute of Science and Technology (KIST), Korea</i>
P1-16 160341	Analysis of Sliding Wear Behavior of Mild Steel by Changing Sliding Speed during Sliding Contact(Effects of Change of Wear Mechanism) Yong-jae Cho , <i>Korea Institute of Industrial Technology, Korea</i> Han-Young Lee , <i>Keimyung University, Korea</i>
P1-17 160346	Photoelasticity and Numerical Analysis the Stress of Elastohydrodynamic Lubrication in Line Contact Yanfei Fang, Jun He, Ping Huang , <i>South China University of Technology, China</i>
P1-18 160347	Carbon Nanostructure Film by DC CVD and Ultra-low Friction Mechanism Fu Yong Wang, Kaixiong Gao, Jing Shi, Junyan Zhang <i>State Key Laboratory of Solid Lubrication, China</i>
P1-19 160350	Study on the Characteristics of the Distribution and Separation of the Temperature according to Inner Surface Roughness of Vortex Tube Seokyeon Im , <i>Tongmyong University, Korea</i> Younghyeon Kim, Jiwon Jeong, Jaeyoung Han, Sangseok Yu <i>Chungnam National University, Korea</i>
P1-20 160355	A Comparative Study on the Impact Wear Behaviors of Human Tooth Enamel, Ti _x Al _y V Alloy and Hydroxyapatite Ceramic Jing Zheng, Jiapin Peng, Jian Wen, Liang Zheng, Zhongrong Zhou <i>Southwest Jiaotong University, China</i>
P1-21 160356	Erosion Behavior of Human Tooth Enamel in the Citric acid Solution Modified with POLYSACCHARIDE Food Gums Liang Zheng, Rui Wu, Dongwen Liu, Jing Zheng, Zhongrong Zhou <i>Southwest Jiaotong University, China</i>
P1-22 160360	A Study on the Frictional Behavior of CNTs Thin Film with Respect to Surface Treatment YounHoo Hwang, Hyun-Joon Kim , <i>Kyoungpook National University, Korea</i>
P1-23 160362	Prediction and Observation of the Drag Torque in Automotive Wet Clutch Ran Zhao , <i>Hannam University, Korea</i> Jinseok Ryu , <i>Amkor Technology, Korea</i> Dong Woo Kwak, In-Ha Sung , <i>Hannam University, Korea</i>

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P1-24 160365	Quantitative Analysis of PAO in Synthetic Engine Oil Young-Kwan Lim, Jieeon Kim, Jong-Ryeol Kim, Jong-Han Ha <i>Korea Petroleum Quality & Distribution Authority, Korea</i>
P1-25 160370	Characterization of Quinoline-Insolubles and Toluene –Insolubles Extracted from Pyrolysis Fuel Oil-Derived Pitch Hye Kyung Shin, Hong Gun Kim, Yong-Sun Kim, Si Hwan Lee, Lee Ku Kwac, <i>Jeonju University, Korea</i>
P1-26 160373	Quantitative Assessment of Friction Characteristics of Single Layer h-BN, MoS ₂ and Graphene Using AFM Cuong Bien Tran Khac, Phuong Quang Nguyen, Koo-Hyun Chung, <i>University of Ulsan, Korea</i>
P1-27 160374	Friction Behavior between Surgical Sutures and Soft Tissues Wei Li, Li Zhang, <i>Southwest Jiaotong University, China</i> Ying Liu, <i>Nanchang University, China</i> Zhongrong Zhou, <i>Southwest Jiaotong University, China</i>
P1-28 160398	Tribological Behaviour of ta-C Coating Films under TiO ₂ Nanopowder Added Lubricant Chin Ean Yeoh, Seock-Sam Kim, <i>Universiti Malaysia Sabah, Malaysia</i> Jong-Hyoun Kim, Si Geun Choi, <i>Korea Institute of Industrial Technology, Korea</i> Willey Yun Hsien Liew, Nancy Julius Siambun, <i>Universiti Malaysia Sabah, Malaysia</i>
P1-29 160402	Protein Nanoparticles Containing Lubricant for Artificial Joint Materials Shiyong Song, Yingying Wang, Wenwen Li, <i>Henan University, China</i>
P1-30 160411	Electrochemical Analysis of Oxidizer and Chelating Agent in CMP Slurry for SS 304 as Flexible Substrate Dasol Lee, Jinyeop Jeong, Haedo Jeong, <i>Pusan National University, Korea</i> Hyunseop Lee, <i>Tongmyong University, Korea</i>
P1-31 160415	Actual Impact Load and Amplitude Measurement during Ultrasonic Nanocrystal Surface Modification Treatment Jun-Hyong Kim, <i>DesignMecha Co., Ltd., Korea</i> Auezhan Amanov, Young-Sik Pyun, <i>Sun Moon University, Korea</i>
P1-32 160416	Changes in Surface Structure and Tribological Property of Anodized Titanium Induced by Hydrothermal Exposure Zhao-Xiang Chen, Li-Mei Ren, Yan-Hong Yan, Xiao-Wen Qi, Yu-Lin Yang <i>Yanshan University, China</i>
P1-33 160418	A Study on the Hardness and Wear Properties of Tetrahedral Amorphous Carbon Coating with Different Elevated Chamber Temperature Ho-Jun Ryu, Yong-Jin Kang, Young-Jun Jang, <i>Korea Institute of Materials Science (KIMS), Korea</i> Ji-Hwan Jeong, <i>Pusan National University (PNU), Korea</i> Jongkuk Kim, <i>Korea Institute of Materials Science (KIMS), Korea</i>
P1-34 160422	Increasing Driving Range of Electric Vehicle by Reducing the Size, Weight and Friction Loss of Ball Bearings Shirmendagva Shirmeesuren, <i>Sun Moon University, Korea</i> Jun-Hyong Kim, <i>DesignMecha Co., Ltd., Korea</i> Auezhan Amanov, Young-Sik Pyun, <i>Sun Moon University, Korea</i>

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P1-35 160424	Design of Accelerated Life Test for Joint Bearing of Construction Equipment Attachments Based on Wear Rate Hong-Gyu Jeon , <i>Hyundai Heavy Industries, Korea</i> Sung-Ho Hong , <i>Dongguk University - Gyeongju, Korea</i> Jae-Hyeong Yoo , <i>Hyundai Heavy Industries, Korea</i> Young-Ze Lee , <i>Sungkyunkwan University, Korea</i>
P1-36 160433	Tribological Properties of a C/C-SiC-Cu Composite Brake Disc Byeong-Choon Goo , <i>Korea Railroad Research Institute, Korea</i>
P1-37 160440	Nanoscale Friction Comparison between Pristine Graphene and Graphene Sheets Dispersed in Pure Water Daehyun Cho, Baekhoon Seong, Doyoung Byun, Young-Ze Lee , <i>Sungkyunkwan University, Korea</i>
P1-38 160442	Surface Wettability Modification of CVD-grown MoS ₂ by Oxygen Plasma Treatment YunJeong Park, Hyukjoon Kwon, Changgu Lee, Kyunghoon Kim , <i>Sungkyunkwan University, Korea</i>
P1-39 160445	Monitoring of Malfunction Behaviors Considering Stochastic Factors in Rotating System Dohun Chin , <i>Dawon Tech, Korea</i> Jongdo Kim , <i>Jungwon University, Korea</i> Yangha Ji, Moonchul Yoon , <i>Pukyong National University, Korea</i>
P1-40 160446	Lubrication Effect and Pressure Distribution of Slider Bearing with Square Shaped Pocket on the Upper Slider Moonchul Yoon , <i>Pukyong National University, Korea</i> Dohun Chin , <i>Dawon Tech, Korea</i> Kwangheui Kim , <i>Pukyong National University, Korea</i>
P1-41 160449	Friction Reduction Effects of Micro Dimple Pattern of Rough Slider Bearing Considering Asperities Contact Miru Kim, Deugwoo Lee, Seungjun Lee, Liang Li , <i>Pusan National University, Korea</i>
P1-42 160455	Effect of Dimple Radius on the Lubrication Characteristics of a Surface Textured Parallel Thrust Bearing Tae-Jo Park, Min-Gyu Kim , <i>Gyeongsang National University, Korea</i>
P1-43 160456	EHL Analysis of Elliptical Contacts with Arbitrary Lubricant Entrainment Tae-Jo Park , <i>Gyeongsang National University, Korea</i>
P1-44 160461	Assessment of Wear Characteristics of Single Layer Graphene, MoS ₂ and h-BN Using Colloidal Probe Atomic Force Microscopy Tien Van Tran, Cuong Bien Tran Khac, Koo-Hyun Chung , <i>University of Ulsan, Korea</i>
P1-45 160462	Friction Characteristics of Mechanically Exfoliated and CVD-grown Single Layer MoS ₂ Dinh Le Cao Ky, Cuong Bien Tran Khac, Koo-Hyun Chung , <i>University of Ulsan, Korea</i>
P1-46 160466	Feedback Study and Tactile Sensibility Control Estimation with Tactile Actuator Using Beat Frequency Min-Seob Kim, Jin-Hwak Park, Young-Ze Lee , <i>Sungkyunkwan University, Korea</i>
P1-47 160467	A Study of Generation of Noise Accordance with Variation of Real Contact Area and Surface Roughness Joo-ho Park, Young-Ze Lee , <i>Sungkyunkwan University, Korea</i>

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P1-48 160469	Numerical Analysis for the Externally Pressurized Journal Bearing with Shape Error Using Semi-Implicit Method Minseok Song, Sang-Shin Park, Yeungnam University, Korea
P1-49 160470	Analysis of Externally Pressurized Air Pad Bearing Using Semi-Implicit Method Gwangwon Park, Sang-Shin Park, Yeungnam University, Korea
P1-50 160472	Dimer Acid Alkyl Ester as a Processing Oil for Butyl Rubber Composite Jeongsuk Yuk, Young-Wun Kim, Jihoon Shin <i>Korea Research Institute of Chemical Technology, Korea</i>
P1-51 160475	Electromagnetic Numerical Analysis Attraction Force Characteristic of the Solenoid Valve in Accordance with the B-H Curve of the Material Sung Kwang Cho, Jinyoung Kim, Byungchul Na, Korea Automotive Technology Institute, Korea Seungyun Seol, Chonnam University, Korea
P1-52 160476	Flow and Thermal Analysis of a Labyrinth Seal Duck-Gyu Lee, Korea Institute of Machinery and Materials(KIMM), Korea Min Jong Kang, Pub Sung Kang, Samwoo Eco., LTD, Korea Wan-Doo Kim, Korea Institute of Machinery and Materials(KIMM), Korea
P1-53 160477	Effect of Normal Forces on Fretting Corrosion of Electrical Contacts Dongwoon Han, Sehyung Kang, Minjung Kim, Ho-Kyung Kim <i>Seoul National University of Science and Technology, Korea</i>
P1-54 160478	Evaluation of Lubrication Performance of Crank Pin Bearing in the Marine Diesel Engine Tae Wan Kim, Pukyong National University, Korea Yong Joo Cho, Pusan National University, Korea
P1-55 160479	Simulation for Contact Angle of Droplet on Riblet Surface Tae Wan Kim, Pukyong National University, Korea Myoung Gyu Lee, Korea University, Korea
P1-56 160481	Observation of Vacuum Pressurized Injection Molding with Respect to the Process Conditions Jie Wu, Jongwon Choi, Hannam University, Korea Seonho Lee, K-Taewoo Co, LTD, Korea In-Ha Sung, Hannam University, Korea
P1-57 160482	Observation of Drag Torque at the Bearing in Automobile Transmission Dong Woo Kwak, Ran Zhao, In-Ha Sung, Hannam University, Korea
P1-58 160483	Mechanical Properties and Tribological Performance of Improved Soft White Metal Treatment on S45C by Laser Cladding Si Geun Choi, Hoon Jae Park, Jin Young Park, Joo young Oh, Jae il Jung, Jong-Hyoung Kim <i>Korea Institute of Industrial Technology, Korea</i> Seock-Sam Kim, Universiti Malaysia Sabah, Malaysia
P1-59 160486	A Study on Total Pressure and Oil Thickness of Connecting Rod Big-end Bearing according to Oil Groove Young Chan Kim, Siyoul Jang, Kookmin University, Korea
P1-60 160487	Frictional Heat Cooling Analysis in Periodic Wet Clutch Engagement Jamin Kong, Siyoul Jang, Kookmin University, Korea

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P1-61 160488	Thermal Analysis of Wet Type DCT according to Relative Velocity and Groove Pattern Jamin Kong, Siyoul Jang, Junyeol Han, Junghee Cho, Kookmin University, Korea
P1-62 160489	A Study of Lubrication Friction between the Piston and Liner in V-type Engine with Cylinder Offset Young Chan Kim, Seojun Kim, Siyoul Jang, Kookmin University, Korea
P1-63 160491	Effects of Bio-Alcohol Mixture Fuel on Dilution Characteristics of Engine Oil in Gasoline Direct Injection Engine Se-Doo Oh, Hyun-Jun Kim, Ho-Kil Lee, Korea Automotive Technology Institute, Korea Cheon-Kyu Park, Korea Institute of Petroleum Management, Korea
P1-64 160492	Performance Testing of Foil Thrust Bearings Choong Hyun Kim, Korea Institute of Science and Technology, Korea
P1-65 160494	Friction Property and Precision Cross Hatch Grooved Pattern by Fiber Laser Engraving Young Hun Chae, Kyungpook National University, Korea
P1-66 160495	Study on the Process Conditions for High Quality of Milled Surface Using Broad Ion Beam Jonghan Won, Korea Electronics-Machinery Convergence Technology institute, Korea Dong Young Jang, Seoul National University of Science and Technology, Korea
P1-67 160499	Research for Effect of Lubricant Oil Aging on Environmental Performance Jeonghwan Kim, Min-ho Lee, Ki-ho Kim, Jong-han Ha Korea Petroleum Quality & Distribution Authority, Korea
P1-68 160503	Prediction of Contact Fatigue Life for Cam-Roller System Considering Lubrication Performance Parameters Sung Chan An, Sang Don Lee, Jung Ho Son, Hyundai Heavy Industries, Korea Yong Joo Cho, Pusan National University, Korea
P1-69 160510	Friction Properties of Laser Textured Surface Dawit Zenebe Segu, Chengxu Lu , Pyung Hwang, Yeungnam University, Korea
P1-70 160516	Rotordynamic Performance of Automotive Turbochargers Supported on Ball Bearings: Test Data versus Predictions Keun Ryu, Kyuman Kim, Howon Yi, Hanyang University, Korea
P1-71 160517	Design and Development of a High Speed Micromachining Spindle Sung-Jin Lee, Keun Ryu, Hanyang University, Korea

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DAY 2 - March 21 TUE

Oral Presentation IV

T11	Lubrication 4	09:00 ~ 10:30	Ball Room 2
Chair	P.L. Patrick Wong, <i>City University of Hong Kong, Hong Kong</i> Hyun-Joon Kim, <i>Kyungpook National University, Korea</i>		
T11-1 160358	Transient Response of Two Lobe Aerodynamic Journal Bearing Saurabh Kumar Yadav , <i>Graphic Era University, India</i> Nathi Ram , <i>Indira Gandhi Delhi Technical University for Women, India</i> Ankur Dixit , <i>Pravin P. Patil Graphic Era University, India</i>		
T11-2 160304	Numerical Optimization of Groat Texture Shapes for Load Carrying Capacity Wei Wang, Yongyong He, Jun Zhao, Yutong Hu, Jianbin Luo , <i>Tsinghua University, China</i>		
T11-3 160376	Hydrodynamic Lubrication in Micro-Textured Surfaces Dillip Kumar Panigrahi, Mihir Sarangi , <i>Indian Institute of Technology Kharagpur, India</i>		
T11-4 160434	Machine Tool Spindle Unit Supported by Water-Lubricated Ceramic Hydrostatic Bearings Shuai Yan, Bin Lin, Wenbin Hu, Xiaofeng Zhang, Feng Liu , <i>Tianjin University, China</i>		
T11-5 160465	Effects of Variable Ramp Extent on the Performance of Gas Foil Thrust Bearings Syed Muntazir Mehdi, Tae Ho Kim , <i>Kookmin University, Korea</i>		
T12	Contact Mechanics 1	09:00 ~ 10:30	Ball Room 3
Chair	Tapani Pakkanen, <i>University of Eastern Finland, Finland</i> Yong Hoon Jang, <i>Yonsei University, Korea</i>		
T12-1 160359	Application of Semi-Hertzian Approach to Predict the Dynamic Behavior of Railway Vehicles Through a Wear Evolution Model Smitirupa Pradhan, Arun Kumar Samantaray, Ranjan Bhattacharyya , <i>Indian Institute of Technology Kharagpur, India</i>		
T12-2 160403	On the Numerical Determination of the Displacement Field due to an Inclusion Xiaoqing Quincy Jin, Pu Li, Xiangning Zhang , <i>Chongqing University, China</i>		
T12-3 160282	The Effect of Wear Particle on the Micro-Contact Model Jeng Haur Horng, Chia-Chun Yu , <i>National Formosa University, Taiwan</i> Yang-Yuan Chen , <i>National Cheng Kung University, Taiwan</i>		
T12-4 160387	Effects of Clustering Distribution of Contact Area on Electrical Contact Resistance Ilkwang Jang, Youngjae Ryu, Yong Hoon Jang , <i>Yonsei University, Korea</i>		
T12-5 160427	A Macroscopic Theory of Active Control of Friction through Normal Oscillation: Stick Phases, Contact Stiffness, System Dynamics Mikhail Popov , <i>Tomsk Polytechnic University, Russian Federation</i>		
T12-6 160426	Efficiency Analysis of a Cycloid Reducer Considering Tolerance Anh-Duc Pham, Hyeong-Joon Ahn , <i>Soongsil University, Korea</i>		

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T13	Surfaces and Interfaces 1	09:00 ~ 10:30	Ball Room 4
Chair	Oleksiy V. Penkov, Yonsei University, Korea Minhaeng Cho, Chung-Ang University, Korea		
T13-1 160464	Running-in Control for Creation of Nanointerface for Super-low Friction Koshi Adachi, Tohoku University, Japan		
T13-2 160421	A Comparative Study on Friction and Wear Behavior of Three Different Steels for Ball Screw by Surface Modification Bakhtiyor Urmanov, Sun Moon University, Korea Jun-Hyong Kim, DesignMecha Co., Ltd, Korea Auezhan Amanov, Young-Sik Pyun, Sun Moon University, Korea		
T13-3 160364	Analysis of the Coated and Textured Ring/Liner Conjunction Based on a Thermal Mixed Lubrication Model Chunxing Gu, Xianghui Meng, Shanghai Jiaotong University, China Di Zhang, Shanghai JianQiao University, China Youbai Xie, Shanghai Jiaotong University, China		
T13-4 160444	Geometric Wear Behavior with Multi-Dimensional Wavelet Analysis and its Mounting Error Compensation Dohun Chin, Dawon Tech. Company, Korea Kwangheui Kim, Moonchul Yoon, Pukyong National University, Korea		
T13-5 160414	Erosive Wear Characteristics of Laser Textured Alumina Based Coatings for Marine Applications Mariyam Jameelah Ghazali, Universiti Kebangsaan Malaysia, Malaysia Juyana A. Wahab, Universiti Malaysia Perlis, Malaysia Yuichi Otsuka, Nagaoka University of Technology, Japan		
T14	Fundamentals of Friction and Wear 2	09:00 ~ 10:30	Ball Room 5
Chair	Seunghwan Lee, Technical University of Denmark, Denmark Tuula T. Pakkanen, University of Eastern Finland, Finland		
T14-1 160405	Developments of Biотribology Research of Artificial Joints Zhongmin Jin, Southwest Jiaotong University, China		
T14-2 160428	Visualization of Tribological Behavior of Graphite in Cast Iron by In Situ Observation of Sliding Interface Alan Hase, Saitama Institute of Technology, Japan		
T14-3 160417	A Study on Wear Characteristics of Alloy Steel with Environmental Condition Tae Gyu Kim, Moon Ki Bae, Ho Ki Leem, Pusan National University, Korea		
T14-4 160404	Random Tangential Asperity Deformation and Its Contribution to the Difference between Static and Kinetic Friction Bo Zhang, Saga University, Japan		
T14-5 160498	Industrial Measurement and Monitoring of Viscosity using Mounted Active Ultrasonics Henry Bruskell, Andy Hunter, Peak to Peak Measurement Solutions, United Kingdom Michele Schirru, Robin Mills, Olivia Manfredi, University of Sheffield, United Kingdom Rob Dwyer Joyce, University of Sheffield, United Kingdom		

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Keynote Talk III, IV		10:45 ~ 12:15	Ball Room 1
Chair	Young-Ze Lee, Sungkyunkwan University, Korea		
160312	Tribology of Polymer Composites and Nanocomposites Nikolai K. Myshkin , Director of Metal-Polymer Research Institute of National Academy of Sciences of Belarus, Belarus		
160454	Advances of Superlubricity Jianbin Luo , Changjiang Scholar Distinguished Professor / Head of Department of Mechanical Engineering, Tsinghua University, China		
Oral Presentation V			
T21	Micro/Nano Tribology 1	13:45~ 15:15	Ball Room 2
Chair	Linmao Qian, Southwest Jiaotong University, China Tae Ho Kim, Kookmin University, Korea		
T21-1 160513	Engineering Oriented Solid Superlubricity Junyan Zhang, Yongfu Wang, Zhenbin Gong, Kaixiong Gao, Bin Zhang Chinese Academy of Sciences, China		
T21-2 160406	Molecular Dynamics Studies for Boundary Lubrications of Carbon-Based Materials Hitoshi Washizu , University of Hyogo / Kyoto University, Japan Tatsuya Maeda, Hirotoshi Akiyama, Masakazu Konishi University of Hyogo, Japan		
T21-3 160392	Tribology of Biomimetic Superhydrophobic Nanopatterns under Varied Physicochemical Conditions Prashant Pendyala , Korea Institute of Science and Technology, Korea Harpreet S Grewal , Shiv Nadar University, India Hong Nam Kim, Il-Joo Cho, Eui-Sung Yoon , Korea Institute of Science and Technology, Korea		
T21-4 160332	Estimation of Adhesion and Contact of Nanowire through Molecular Dynamics Simulation Hyun-Joon Kim , Kyungpook National University, Korea Koo-Hyun Chung , University of Ulsan, Korea		
T21-5 160283	The Flow Characteristic of Solid Particles as Additives for Lubricant in Point Contact Area Tianyi Sui , Tianjin University, China Feng Zhang, Baoyu Song, Yuanyuan Chen , Harbin Institute of Technology, China		
T22	Contact Mechanics 2	13:45~ 15:15	Ball Room 3
Chair	Jeng Haur Horng , National Formosa University, Taiwan Keun Ryu , Hanyang University, Korea		
T22-1 160289	DLC-Based Coatings for Bio Applications Oleksiy V. Penkov , Yonsei University, Korea Mehdi Kheradmandfar , University of Teheran, Iran Chang-Lae Kim, Jung-Seung Lee, Seung-Woo Cho, Dae-Eun Kim , Yonsei University, Korea		

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T22-2 160490	Real-Time Industrial Contact Pressure Measurement and Monitoring using Mounted Active Ultrasonics Henry Brunsell, Andy Hunter, <i>Peak to Peak Measurement Solutions / University of Sheffield, UK</i> Rob Dwyer Joyce, Roger Lewis, <i>University of Sheffield, UK</i>		
T22-3 160385	Numerical Investigation for a Transient Thermoelastic Sliding Contact Problem Sanghoon Lee, YongWoo Lee, Yong Hoon Jang, <i>Yonsei University, Korea</i>		
T22-4 160413	Formation of Nanointerface during Running-in for Low Friction of Silicon Carbide in Water Hirotsuma Sato, Koshi Adachi, <i>Tohoku University, Japan</i>		
T22-5 160384	Frictional Contact Behaviors of Beam under Cyclic Loading Jae Hyung Kim, Hwangbo Seung, Yong Hoon Jang, <i>Yonsei University, Korea</i>		
T23	Surfaces and Interfaces 2	13:45~ 15:15	Ball Room 4
Chair	Chunxing Gu, Shanghai Jiaotong University, China Moonchul Yoon, Pukyong National University, Korea		
T23-1 160391	Evolution of Surface Roughness in Chemical Dissolution Processes Prashant Pendya, <i>Indian Institute of Science, India / Korea Institute of Science and Technology (KIST), Korea</i> M.S. Bobji, Giridhat Madras, <i>Indian Institute of Science, India</i> Eui-Sung Yoon, <i>Korea Institute of Science and Technology (KIST), Korea</i>		
T23-2 160295	Observation of Micro-Wear Characteristics of Metal Thin Film Kyeong-Hee Kang, Dae-Eun Kim, <i>Yonsei University, Korea</i>		
T23-3 160399	Water Sliding Friction of Hierarchical Hydrophobic Paint Surfaces Tapani A. Pakkanen, Anna Kirveslahti, Kati Mielonen, Wenjuan Cui, Mika Suvanto <i>University of Eastern Finland, Finland</i>		
T23-4 160390	Dry Sliding Wear Behavior of SiC Ceramic Heated up to Half of Its Melting Point Auezhan Amanov, Bakhtiyor Urmanov, <i>Sun Moon University, Korea</i> In-Ho Cho, <i>DesignMecha Co., Ltd, Korea</i> Young-Sik Pyun, <i>Sun Moon University, Korea</i>		
T23-5 160382	Tribological Characteristics of Micro-Textured Polyoxymethylene under Starved Lubrication Conditions Minhaeng Cho, Junho Jeong, <i>Chung-Ang University, Korea</i>		
T23-6 160409	Surface Properties of CVD Graphene on Various Substrates Min-Ah Yoon, Chan Kim, <i>Korea University of Science and Technology (UST) / Korea Institute of Machinery and Materials (KIMMI), Korea</i> Hyun-June Jung, <i>Center for Advanced Meta-Materials (CAMM), Korea</i> Jae-Hyun Kim, Kwang-Seop Kim, <i>Korea Institute of Machinery and Materials (KIMMI), Korea</i>		
T24	Fundamentals of Friction and Wear 3	13:45~ 15:15	Ball Room 5
Chair	Shuwei Liu, Tsinghua University, China Deugwoo Lee, <i>Pusan National University, Korea</i>		
T24-1 160460	A Study on Wear Characteristics of SCM415 Steel with Various Coating Conditions Il Heon Jeong, Yeong Min Park, Tae Gyu Kim, <i>Pusan National University, Korea</i>		
T24-2 160288	Sliding Friction of Shale Rock on Quarts Sand Particles in Hydraulic Fracturing Huijie Zhang, Shuhai Liu, Huaping Xiao, <i>China University of Petroleum-Beijing, China</i>		

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T24-3 160343	Wear Mode Investigations of Polymers using Analytical Model Sandip Panda, Mihir Sarangi, S. K. Roy Chowdhury , Indian Institute of Technology Kharagpur, India		
T24-4 160493	Modeling and Analysis of a Fluid Viscous Damper Considering Piston Rod Hoang Huy Vu, Hyeong-Joon Ahn , Soongsil University, Korea		
T24-5 160328	Formation Process and Tribological Behaviors of the Surface Layer Coated by Sintered Serpentine Powders Junwei Wu, Xiao Wang, Luhai Zhou, Xicheng Wei , Shanghai University, China		
T25	Lubricants Symposium 1	13:00~ 15:00	Ball Room 1
Chair	Wan-Seop Kwon, SK Innovation		
T25-1 160333	The Effect of MoDTC Chemical Structure on Friction Reduction Properties Kenji Yamamoto, Shinji Iino, Yukiya Moriiizumi , ADEKA Corporation, Japan		
T25-2 160335	Oil Soluble Polyalkylene Glycols as Component for Engine Oil and Automotive Gear Oil Ken Han, Ashish Kotnis , Dow Chemical Investment Co., Ltd, China		
T25-3 160453	Improving Vehicle Fuel Efficiency through the Right Choice of Viscosity Modifier in Engine Oils Frank Lauterwasser, Boris Eisenberg, Phil Hutchinson, Wonpyo Lee , Evonik, Korea		
T25-4 160496	Development Trend of Automotive Transmission & Axle Lubricants Sung-uk Lee, Dae-yun Bae , Hyundai Motor Company, Korea		
T26	Lubricants Symposium 2	13:00~ 14:00	Ball Room 6
Chair	Gu-Jun Kwon, BIT Buhmwoo, Korea		
T26-1 160509	An Approach to Lubricants Performance Improvement in Excavator Dongseob Shim, Wonho Lee, Daeho Kim , Doosan Infracore, Korea		
T26-2 160502	Fretting Wear Study : Effect of the Addition of Azelaic-A and Azelaic-B into Lithium Complex Greases Chin Shia Chang , Emery Oleochemicals (M) Sdn Bhd, Malaysia Michael E. Brooks, Mark Durchholz , Emery Oleochemicals LLC, USA		
Keynote Talk V, VI		15:30 ~ 17:00	Ball Room 1
Chair	Koo-Hyun Chung, University of Ulsan, Korea		
160412	Friction Fade-Out at DLC Film Slid by ZrO ₂ Pins under Heavy Applied Load Takahisa Kato , President of Japanese Society of Tribologists / Department of Mechanical Engineering, The University of Tokyo, Japan		
160430	Method of Dimensionality Reduction and Boundary Element Method: Foundations and Applications in Contact Mechanics and Tribology Valentin L. Popov , Head of Department of System Dynamics and the Physics of Friction / Technische Universität Berlin, Germany		

DAY 3 - March 22 WED

Oral Presentation VI			
W11	Micro/Nano Tribology 2	9:00 ~ 10:30	Ball Room 2
Chair	Prashant Pendyala , Korea Institute of Science and Technology, Korea Hyun Joon Kim , Kyungpook National University, Korea		
W11-1 160439	Probe Genesis of Tribology using In-Situ Technology Yeau-Ren Jeng , National Chung Cheng University, Taiwan		
W11-2 160266	Liquid Superlubricity Achieved between Silica Surfaces with C ₁₆ TAB Micelles Jinjin Li, Jianbin Luo , Tsinghua University, China		
W11-3 160410	Defects of CVD Graphene in Transfer Process Chan Kim, Min-Ah Yoon , Korea University of Science and Technology (UST) / KIMM, Korea Hyun-June Jung , Center for Advanced Meta-Materials (CAML), Korea Jae-Hyun Kim, Kwang-Seop Kim , Korea Institute of Machinery and Materials (KIMM), Korea		
W11-4 160372	Effect of Applied Force on Wear Characteristics of Single-Layer h-BN, MoS ₂ , and Graphene Cuong Bien Tran Khac, Koo-Hyun Chung , University of Ulsan, Korea		
W11-5 160274	Effect of Crystallographic Anisotropy on the Material Removal of Monocrystalline Silicon Linmao Qian, Chen Xiao, Peng Zhang, Lei Chen , Southwest Jiaotong University, China		
W12	Bearings and Seals	9:00 ~ 10:30	Ball Room 3
Chair	Henry Brunsell , Peak to Peak Measurement Solutions, UK Young Sup Kang , The Timken Company, USA		
W12-1 160459	Reliability Improvement of Bearings in Vacuum Cleaner Motors Eun-Ji Hwang, Sung-Gi Kim, Byung-Jik Kim, Dong-Han Kim , LG Electronics, Korea		
W12-2 160408	Durability Test of Ball Bearing and Evaluation of Cage Stability in Cryogenic Environments for Liquid Rocket Engine Turbopump Bok Seong Choe, Woo-Seok Seo, Jeon-Kook Lee, Yong-Bok Lee Korea Institute of Science and Technology (KIST), Korea		
W12-3 160273	The Role of Carbides Dissolution in the Formation of White Etching Areas (WEA) of Bearing Steel Sreeraj Kodoor, Ramkumar Penchaliyah, Shubham Kale Indian Institute of Technology Madras (IITM), India		
W12-4 160437	Experimental Clearance Analysis of Steam Turbine Brush Seal Dmytro Timchenko , Kyiv Polytechnic Institute, Ukraine / Korea Institute of Science and Technology (KIST), Korea Jaeseung Byun, Yong-Bok Lee Korea Institute of Science and Technology (KIST), Korea		
W12-5 160371	Wear in Polymer/MoS ₂ Composite Cage for High Speed Cryogenic Ball Bearing Jeon-Kook Lee , Korea Institute of Science and Technology, Korea Woo-Seok Seo , Korea Institute of Science and Technology / Hanyang University, Korea Bok Seong Choe , Korea Institute of Science and Technology, Korea Young-Do Kim , Hanyang University, Korea Yong-Bok Lee , Korea Institute of Science and Technology, Korea		

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W13	Tribology in Applications 1	9:00 ~ 10:30	Ball Room 4
Chair	Wenjing Fan, Tsinghua University, China Hyunseop Lee, Tongmyong University, Korea		
W13-1 160506	Closing the Loop and Eco-Friendly Tribology Products Satish Vasu Kailas, P S Suvin, H N Shubha, Indian Institute of Science, India Jagadeesh K Mannekoty, Jyothi Institute of Technology Campus, India		
W13-2 160381	Application of a Novel CMP Conditioner with Controlled Micro Features Sunghoon Lee, Wen Yin Lu, Tai Fong Chao, Amaranth Jha, Dinesh Penigalapati, Ji Chul Yang, Dinesh Koli, Globalfoundries, USA Jae Ho Han, Youngjae Kang, Kang Joon Kim, Woo Won Jeong, Shinhan Diamond, Korea		
W13-3 160336	High-Speed Contact Study between a Ti-6-Al-4V Tool and an Abradable Coating using Ballistic Benches and a Dynamic Compensation Approach Andrea Cappella, Julien Vincent, Sylvain Philippon, Laurent Faure Université de Lorraine, France		
W13-4 160515	Squeeze Film Dampers in Automotive Turbochargers: Test Rig Development for Experimental Parameter Identification Keun Ryu, Hanyang University, Korea Sung-Hwa Jeung, Ingersoll Rand, USA Jisu Hwang, Hanyang University, Korea		
W13-5 160518	Structural Stiffness and Damping Coefficients of Wire Mesh Dampers for Small Automotive Turbochargers: Static Load Performance Howon Yi, Keun Ryu, Hanyang University, Korea		
W14	Fundamentals of Friction and Wear 4	9:00 ~ 10:30	Ball Room 5
Chair	Philippe Vergne, University of Lyon, France Hyo-Sok Ahn, Seoul National Univ. of Science & Technology, Korea		
W14-1 160320	Scratch Test for Coatings and Thin Films Hyo-Sok Ahn, Seoul National Univ. of Science & Technology		
W14-2 160339	Influence of Ultrasonic Excitation of the Lubricating Fluid on the Friction and Wear Characteristics of Metal-Metal Pairings – A Preliminary Study Viktor Krasnik, Josef Schlattmann, Hamburg University of Technology, Germany		
W14-3 160378	Tribology of Polybenzimidazole in High Temperature, Dry Conditions Janet Wong, Annelise Jean Fulcrand, Marc Masen, Imperial College London, UK		
W14-4 160480	Advanced Characterization Method to Investigate Friction, Wear and Surface Morphology Change With Time Jun Xiao, Tushar Khosla, Rtec-Instruments Inc., USA		
W14-5 160286	A Rolling Friction Control Study of Magnetorheological Elastomer Chenglong Lian, Kwang-Hee Lee, Chul-Hee Lee, Inha University, Korea		

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W15	Lubricants Symposium 3	8:30 ~ 11:30	Ball Room 1
Chair	Hee-Yong Oh, Lubrizol, Korea		
W15-1 160471	Looking Beyond Viscosity for Improved Drivetrain Efficiency William Barton, Alex Wang, Lubrizol Ltd., UK		
W15-2 160474	Balancing Durability and Improved Fuel Economy in Light and Ultra-Light Viscosity Grades Roberta Bompardola, Marco Corradi, Infineum, Singapore Andrew Ritchie, Rajiv Taribagil, Infineum, USA		
W15-3 160500	"Universal" Fluids for Continuously Variable Transmissions and Step Automatic Transmissions Francis Dyeo, Afton Chemical Asia Pte Ltd, Singapore Timothy J. Henly, Christopher S. Cleveland, Lee Saathoff, Tracy McCombs <i>Afton Chemical Corporation, United States</i> Tsuneo Adachi, Hideaki Mitsui, Afton Chemical Japan Corporation, Japan Kenji Yatsunami, Jimmy Liu, Jackie Zhou, Afton Chemical (Suzhou) Co., Ltd, China		
W15-4 160507	Coming of Age of the China Market – Global Synchronized Introduction of the Latest Categories and how to Manage the Process Jerry Wang, Chen Gang, Vincent Qin <i>Chevron Oronite (Beijing) International Trading Co., Ltd, China</i>		
W15-5 160508	Base Oil Characteristics for Challenging Engine Oil Formulations Hak-Mook Kim, Kang-Min Jung, Young-Rae Cho, SK Innovation, Korea		

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Oral Presentation VII

W21	Micro/Nano Tribology 3	10:45 ~ 12:15	Ball Room 2
Chair	Jinjin Li, Tsinghua University, China Koo Hyun Chung, University of Ulsan, Korea		
W21-1 160325	Tribological Characteristics of Superhydrophobic Silicon Surface Huichen Zhang, Xuelian Qi, Xiaolei Li, Dongdong Shi, Dalian Maritime University, China		
W21-2 160380	Nanomechanical and Nanotribological Properties of Polymeric Binders using Atomic Force Microscope Quang Dang Nguyen, Hau Gia Nguyen, Minh Hien Thi Nguyen, Eun-Suok Oh and Koo-Hyun Chung <i>University of Ulsan, Korea</i>		
W21-3 160447	Robust Microscale Superlubricity under High Contact Pressure Enabled by Graphene-Coated Microsphere Shuwei Liu, Tianbao Ma, Tsinghua University, China Gui Yu, Chinese Academy of Sciences, China Jianbin Luo, Tsinghua University, China		
W21-4 160397	Adhesion Behavior of Solder Pastes Yeon-Woo Jeong, Chan Kim, Min-Ah Yoon, Yun Hwangbo, Kyung-Shik Kim, <i>Korea University of Science and Technology (UST), Korea</i> Jae-Hyun Kim, Kwang-Seop Kim, Korea University of Science and Technology (UST) / Korea Institute of Machinery and Materials (KIMM), Korea		
W22	Tribology of Machine Elements and Systems	10:45 ~ 12:15	Ball Room 3
Chair	Ramkumar Penchalaiah, Indian Institute of Technology Madras, India Sunghoon Lee, Globalfoundries, USA		
W22-1 160316	Multi-Objective Optimization of Spur Gearbox Considering Tribological Aspects Maruti B Patil, Ramkumar Penchalaiah, Shankar Krishnappillai <i>Indian Institute of Technology Madras (IITM), India</i>		
W22-2 160323	Polymer Cage Dynamics for Tapered Roller Bearings Young Sup Kang, Jerry P. Rhodes, Alan Dale Buchanan, The Timken Company, USA		
W22-3 160353	Numerical Study of Two-phase Mechanical Face Seals Based on Homogeneous Phase Change Model Wenbin Gao, Weifeng Huang, Tao Wang, Ying Liu, Xiangfeng Liu, Yuming Wang <i>Tsinghua University, China</i>		
W22-4 160425	A Study on the Running Torques of Angular Contact Ball Bearings Subjected to Radial Load and Angular Misalignment Van-Canh Tong, Seong-Wook Hong, Kumoh National Institute of Technology, Korea		

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W23	Tribology in Applications 2	10:45 ~ 12:15	Ball Room 4
Chair	Andrea Cappella , <i>LaBPS, France</i> Hyunseop Lee , <i>Tongmyong University, Korea</i>		
W23-1 160338	Slippery Silicone Rubbers in Aqueous Environment Seunghwan Lee, Troels Røn, Irakli Javakhishvili, Søren Hvilsted, Katja Jankova <i>Technical University of Denmark, Denmark</i>		
W23-2 160361	A Data-driven Approach to Condition Monitoring of Electromagnetic Brakes using Artificial Neural Networks Tanju Gofran , <i>Karlsruhe Applied Science University, Germany</i> Timo Hufnagel, Björn Hagemann , <i>SEW-EURODRIVE GmbH & Co KG, Germany</i> Peter Neugebauer , <i>Karlsruhe Applied Science University, Germany</i> Dieter Schramm , <i>University of Duisburg-Essen, Germany</i>		
W23-3 160285	Study of Friction and Shear Damping Effect of Magnetorheological Elastomer Jin-Woo Lim, Kwang-Hee Lee, Chul-Hee Lee , <i>Inha University, Korea</i>		
W23-4 160290	Analysis of the Failure in Dry Gas Seal Based on Acoustic Emission Method Wenjing Fan , <i>Tsinghua University, China</i>		
W23-5 160435	Experimental Investigation on the Tribological Behaviour of Unlubricated Carbon Steels Amadi Simeon Onuba, Chinwuba Victor Ossia , <i>University of Port Harcourt, Nigeria</i> Steven Odi Owei , <i>Rivers State University of Science & Technology, Nigeria</i>		

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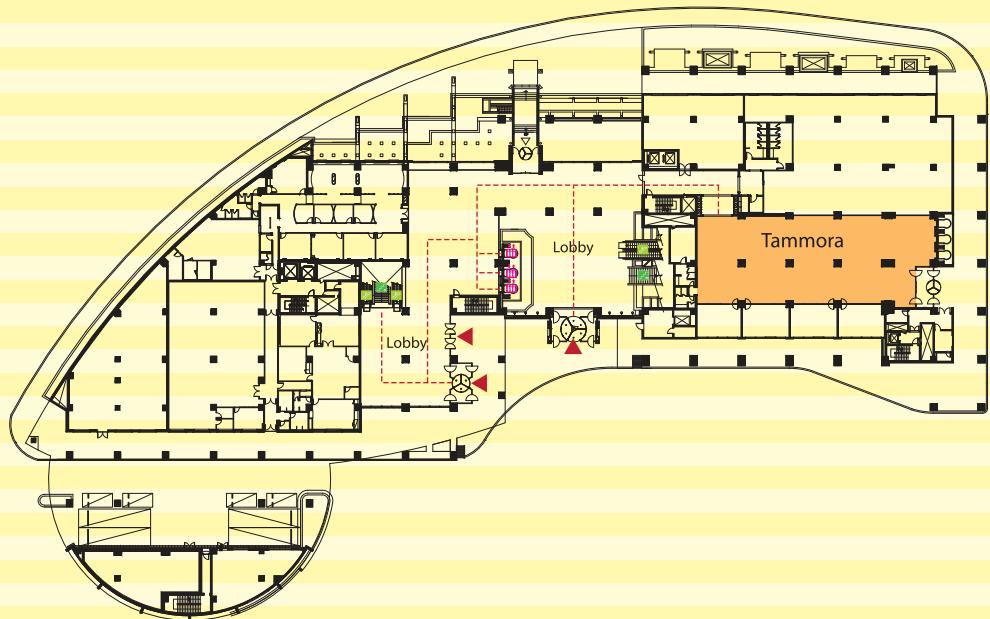
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Elevator

Toilet

Escalator

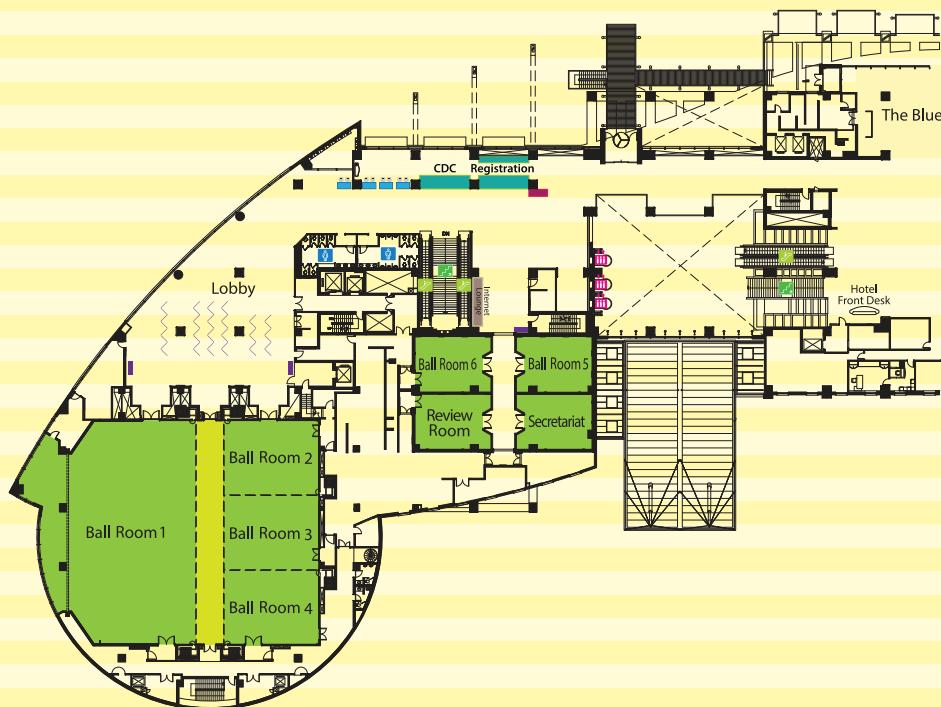
Stair





2F

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| | Exhibitions |
| | Registration Booth |
| | Desk & Board |
| | Posters |
| | Coffee Break |
| | Internet Lounge |
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