

Preface

Ecomaterials, or “Green materials” are those designed to minimize environmental impact and to harmonize with human and environment, by maintaining or maximizing materials performance with reducing environmental burden. Ecomaterials research is an interdisciplinary field that scientists and engineers with background among chemistry, physics, and materials such as metals, ceramics, polymers, and carbon are involved in understanding the environmental consciousness in industries and motivating ecological researches. International Symposium on Eco-materials Processing and Design series aim to promote the development of this field, and were successfully held in South Korea, Japan and Nepal etc. in the past 16 years. Following the tradition of this symposium series, ISEPD2016 was held in January 8-11, 2016 at the Hainan University in Haikou, China. This conference provided an ideal platform and excellent opportunities for researchers and experts in eco-materials from around the world to exchange research ideas and practical experiences.

The topics of the ISEPD2016 included New energy materials and evaluations, Biomaterials Nanomaterials and devices, Ecological materials, Porous materials, Marine materials and New processes and technology of material fabrication. More than 100 pre-registered authors submitted their works in the ISEPD2016. This volume contains papers presented on the ISEPD2016

Organizing an international conference involves great energy to finish complex and substantial detail therefore we would like to express my gratitude to all members of ISEPD2016 organizing committee for their sincere cooperation to hold this event. ISEPD2016 would not be possible without our keynote speakers, invited speakers, presenters, all participants who attended the ISEPD2016 conference and Hainan University. We would like to thank for all support and authors who submitted their manuscripts on time.

We would like to thank the generous financial support so far through the Core University program between the Korea Science and Engineering Foundation and the Japanese Society of the Promotion Science (JSPS) for this series international conferences from 2000 to 2007. From 2009 to 2013, the A3 foresight Program among the National Research Foundation in Korea, the JSPS in Japan, and the National Natural Science Foundation of China. After these two important programs, the Global Research Laboratory Program in Korea between the Sun Moon University in Korea and the Osaka University in Japan has helped the some part of financial support such as speakers' flight tickets since 2010.

Chair of Organizing Committee

Jianbao Li

Editors

Jian Feng Yang, Hyung Sun Kim, Tohru Sekino, Wen Bin Cao, Soo Wohn Lee

Committees

Organizing Committee

General Chair

Jianbao Li, Hainan University, China

Soo Wohn Lee, Sun Moon University, Korea

Kozo Ishizaki, Nagaoka University of Technology, Japan

Tohru Sekino, Osaka University, Japan

Hong Lin, Tsinghua University, China

Yubao, Li, Sichuan University, China

Local Organizing Committee

Chair: Yong Chen, Hainan University, China

Co-Chair: Hong Lin, Tsinghua University, China

Members:

Yucang Zhang, Hainan University, China

Yongjun Chen, Hainan University, China

Daming Chen, Hainan University, China

De Li, Hainan University, China

Jie Du, Hainan University, China

Chunfu Lin, Hainan University, China

Lijie Luo, Hainan University, China

Jihui Li, Hainan University, China

Chang Lin, Hainan University, China

Academic Committee

Chair: Yucang Zhang, Hainan University, China

Members:

Eiji Tani, Advanced Industrial Science and Technology, Japan

Feng Pan, Tsinghua University, China

Guan-Jun Qiao, Jiangsu University, China

Hao Wang, Wuhan University of Technology, China

Hojung Chang, DanKuk University, Korea

HyungMee Lim, KICET, Korea

HyungSun Kim, Inha University, Korea

Do Jin Kim, Chungnam University, Korea

Jian-Feng Zhu, Shaanxi University of Science and Technology, China

KeunYoung Yeum, Sunggyunkwan University, Korea

KyungNam Kim, Gangwon University, Korea
Li Fu, Northwest Polytechnic University, China
M. Nanko, Nagaoka University of Technology, Japan
Masaya Matsuoka, Osaka Prefecture University, Japan
Junichi Matsushita, Tokai University, Japan
Nguyen Duc Chien, ITIMS-HUST, Vietnam
Nguyen Hoang Luong, Vietnam National University in Hanoi, Vietnam
Nguyen Huu Duc, Vietnam National University in Hanoi, Vietnam
Nguyen Xuan Phuc, Materials Research Society, Vietnam
SangYup Park, Kangnung University, Korea
Shinya Higashimoto, Osaka Institute of Technology, Japan
Shu Yin, Tohoku University, Japan
Soichiro Sameshima, Kagoshima University, Japan
T. Shirai, Nagoya Institute of Technology, Japan
Tadachika Nakayama, Nagaoka University of Technology, Japan
Takanori Watari, Saga University, Japan
Takashi Kamegawa, Osaka University, Japan
Tohru Sekino, ISIR, Osaka University, Japan
WonYong Kim, KITECH, Korea
Yamato Hayashi, Tohoku University, Japan
Yoshihiro Hirata, Kagoshima University, Japan
YoungHee Kim, KICET, Korea
Zeng Yi, Shanghai Institute of Ceramics, China
Xuebin Zheng, Shanghai Institute of Ceramics, China
Jing Sun, Shanghai Institute of Ceramics, China
Wenbin Cao, University of Science and Technology Beijing, China
Kwang Bo Shim, Hanyang University, Korea

International Advisory Committee

Alfredo-Aguilar Elguezabar, CIMAV, Mexico
Banh Tien Long, Hanoi University of Science and Technology, Vietnam
BoYoung Hur, KyungSang national University, Korea
ByungSe Jun, Kyungnam University, Korea
Chiaki Terashima, Nagoya University, Japan
Chuangxian Ding, Shanghai Institute of Ceramics, China
Dongfeng Xue, Changchun Institute of Applied Chemistry, China
Detlef Bahaneman, University Hannover, Germany
Djega Marriadassou, Paris VI University, France
Ernesto Indacochea, University of Illinois at Chicago, USA
G. P. Li, University of California, Irvine, USA

Hideo Nakajima, Wakasawan Energy Research Center, Japan
Hirotugu Takizawa, Tohoku University, Japan
Jian-Feng Huang, Shaanxi University of Science and Technology, China
Jian-Feng Yang, Xi'an Jiaotong University, China
Jing Sun, Shanghai Institute of Ceramics, China
Joaquin Lira-Olivares, Simon Bolivar University, Venezuela
Jun Yang, Xi'an University of Architecture and Technology, China
Junichi Hojo, Kyushu University, Japan
Junichi Matsushita, Tokai University, Japan
Ke-Zheng Sang, ChangAn University, China
Klass de Groot, Leiden University, The Netherlands
Kuniyuki Kitagawa, Nagoya University, Japan
KwangSun Kim, Seoul National University, Korea
Liangdeng Yu, Chiang Mai University, Thailand
Lei Jiang, Beihang University, China
Leticia M. Torres-Martinaz, Universidad Autonoma De Nuevo Leon, Mexico
Lian Gao, Shanghai Institute of Ceramics, China
Lidong Chen, Shanghai Institute of Ceramics, China
Klass de Groot, Leiden University, The Netherlands
Lidong Chen, Shanghai Institute of Ceramics, China
NakJung Kim, POSTEC, Korea
Qingling Feng, Tsinghua University, China
Osamu Takai, Kanto Gakuin University
Robert Hurt, Brown University, USA
ShaoXiong Zhou, Advanced Technology & Materials Co. Ltd., China
Simo-Pekka Hannula, Helsinki University of Technology, Finland
Somchai Thongtem, Chiang Mai University, Thailand
Supab Choopun, Chiang Mai University, Thailand
Xianhong Wang, ChangChun Institute of Applied Chemistry, China
Xue-Gang Luo, Southwest University of Science and Technology, China
Yasuo Uchiyama, Nagasaki University, Japan
ZhengYi Fu, Wuhan University of Technology, China
Zhen-Lin Lu, Xi'an University of Technology, China
Zuoren Nie, Beijing University of Technology, China

Sponsors

Organized by

College of Materials and Chemical Engineering,
Hainan University, Haikou, Hainan, China

Sponsored by

Global Research Laboratory (GRL) Program, Korea
Japan Society for the Promotion of Science (JSPS), Japan
National Research Foundation of Korea (NRF-Korea)
National Natural Science Foundation of China (NSFC)