

## Preface

It is our great pleasure to welcome you to the 2016 International Conference on Mining, Material and Metallurgical Engineering (ICMMME 2016) which has been held in Seoul, Korea during April 15-17, 2016. ICMMME 2016 is dedicated to issues related to mining, material and metallurgical engineering.

The major goal and objectives of the conference is to bring academic scientists, engineers, industry researchers together to exchange and share their experiences and research results, and discuss the practical challenges encountered and the solutions adopted. Distinguished experts in the area and professors in Korea will be invited as Keynote Speakers to deliver the latest information in their respective expertise areas. It will be a golden opportunity for the students, researchers and engineers to interact with the experts and specialists to get their advice or consultation on technical matters, sales and marketing strategies.

This volume presents a selection of 24 papers submitted to the conference from universities, research institutes and industries. All of the papers were subjected to peer-review by conference committee members and external reviewers. The papers selected for this volume depended on their quality and their relevancy to the conference. The volume tends to present to the readers the recent advances in the field of mining, material and metallurgical engineering and the papers published focus on the following 4 particular areas, including Polymers and Composites, Design and Analysis of Building Materials and Concrete Structures, Special Functional Materials and Technologies in Mechanical Engineering, Materials and Technologies in Area of Renewable Energy.

We would like to thank all the authors who have contributed to this volume and also to the organizing committee, reviewers, speakers, chairpersons, sponsors and all the conference participants for their support to ICMMME 2016.

Prof. Ramesh K. Agarwal  
Washington University in St. Louis, USA  
May 5, 2016

# Committees

## Advisory Chairs

Prof. Zhan Chen, AUT University, New Zealand  
Prof. Changduk Kong, Chsoun University, South Korea

## Conference General Co-chairs

Prof. Ramesh K. Agarwal, Washington University in St. Louis, USA  
Prof. Kwang Bum Kim, Yonsei University, Republic of Korea

## Program Committee Chairs

Prof. Cheul Ro Lee, Chonbuk National University, Korea  
Prof. Ho-Sung Lee, Korea Aerospace Research Institute, Korea  
Prof. Jeongmin Kim, Daejin University, South Korea  
Prof. Hern Kim, Department of Environmental Engineering and Biotechnology, Korea  
Prof. Choi Seong Soo, SunMoon University, South Korea  
Prof. Yang-Kook Sun, Hanyang University, Korea

## International Technical Committees

Prof. Abdul Razak bin Rahmat, Technological University of Malaysia-UTM, Malaysia  
Dr. Bashir Ahmmad, Yamagata University, Japan  
Dr. Hongyan Li, Montana State University, USA  
Prof. Kwang Bum Kim, Yonsei University, Republic of Korea  
Prof. Chi-Cheng Cheng, National Sun Yat-Sen University, Taiwan  
Prof. İlhan Asiltürk, Selcuk University, Turkey  
Dr. Serhat İkizoğlu, Istanbul Technical University, Turkey  
Prof. Renjun PEI, Columbia University, USA  
Dr. Ji-Gunag Li, National Institute for Materials Science, Japan  
Prof. Liqun Zhu, Beihang University, China  
Dr. Sureerat Polsilapa, Kasetsart University, Thailand  
Dr. S.Arungalai Vendan, Veltech Technical University, India  
Dr. Mary Donnabelle Balela, University of the Philippines, Philippines  
Dr. Yusri Yusof, Universiti Tun Hussein Onn Malaysia  
Prof. Md Amin Bin Hashim, Universiti Teknologi MARA (UiTM), Malaysia  
Dr. Noor Najmi Bonnia, UiTM Shah Alam, Selangor, Malaysia  
Prof. Nor Aini Wahab, Universiti Teknologi MARA, Malaysia  
Dr. Or Sabirin Mohamed, University of Malaya, Malaysia  
Prof. Kodakkal Kannan Viswanathan/Universiti Teknologi Malaysia, Malaysia  
Prof. Dedi Priadi, Kampus Universitas Indonesia, Indonesia  
Dr. Kaykhosrow Khojier, Islamic Azad University, Chalous, Iran  
Prof. Nader Nariman-Zadeh, Guilan University, Iran