

## Preface

It was a great pleasure to welcome all the participants in the 8th International Conference on Material Science and Engineering Technology (ICMSET 2019) held in NTU@one-north, Singapore 19-21 October 2019. ICMSET is dedicated to new research developments and advances in the fields of Material Science and Engineering Technology.

The key goal of the conference was to bring the academic scientists, engineers, and industry researchers together to exchange and share their expertise, experience and research results, and discuss the challenges and future directions in their specialized areas of research in these fields. Two professors from Singapore and one professor from USA delivered the keynote lectures and two professors from China, one professor from Japan and a professor from Russia delivered the invited lectures about state of the art research in their areas of expertise. Researchers from Singapore, China, Russia, USA, Japan, Egypt, Korea, Indonesia, Czech Republic, Poland, India and so on altogether 18 countries participated in the conference.

The conference provided a golden opportunity for the students, researchers and engineers to interact with the experts and specialists to discuss with them on technical matters and future directions of research.

The proceeding of the conference consists of papers from the universities, research institutes and industry. The papers were selected after a rigorous peer-review by the conference committee members and international reviewers. The papers should provide the readers an overview of many recent advances in the fields related to materials science and engineering technology including the modeling, analysis, computation and optimization as well as the experimental methods.

I would like to thank all the authors who have contributed to this volume and also to the members of the organizing committee, reviewers, speakers, chairpersons, sponsors and the conference participants for their support to ICMSET 2019.

Prof. Ramesh K. Agarwal, Conference Chair  
Washington University in St. Louis, USA

# Committees

## Conference Chair

Ramesh K. Agarwal, Washington University in St. Louis, USA

## Program Chairs

Jun Song Chen, University of Electronic Science and Technology of China

Aleksey Vedyagin, Boreskov Institute of Catalysis SB RAS, Russia

## Publicity Chairs

Mohamed Abdel-Hady Gepreel, Egypt-Japan University of Science and Technology, Egypt

Carlos Rolando Rios-Soberanis, Centro de Investigación Científica de Yucatán, Mexico

## Technical Committees

Chi-Wai Kan, The Hong Kong Polytechnic University, Hong Kong, China

Liang An, The Hong Kong Polytechnic University, Hong Kong, China

Nataliia Tarasova, Ural Federal University, Russia

Nikolay Konstantinovich Poluyanovich, Southern Federal University, Russia

Mohd Azlan Mohd Ishak, MARA University of Technology, Malaysia

Mohd Idris Shah Ismail, University Putra Malaysia, Malaysia

Syafiqah Saidin, UNIVERSITI TEKNOLOGI MALAYSIA, Malaysia

Ng Soo Ai, University Tunku Abdul Rahman, Malaysia

Rinlee Butch Cervera, University of the Philippines Diliman, Philippines

Ruth R. Aquino, Mapua University, Philippines

Bryan B. Pajarito, University of the Philippines Diliman, Philippines

Mary Donnabelle Balela, University of the Philippines Diliman, Philippines

Marvin Herrera, University of the Philippines Los Banos, Philippines

Bonifacio T. Doma, Mapúa University, Philippines

Hira Meidia, Universitas Multimedia Nusantara, Indonesia

Emi Erawati, Universitas Muhammadiyah Surakarta, Indonesia

Ir. Marwan, Universitas Syiah Kuala, Indonesia

Jirapornchai Suksaeree, Rangsit University, Thailand

Teewara Suwan, Chiang Mai University, Thailand

Keimei Oh, Akita Prefectural University, Japan

Chil-Chyuan Kuo, Ming Chi University of Technology, Taiwan

Yu-Chih Tzeng, National Defense University, Taiwan

Ferdi Akman, Bingöl University, Vocational School of Technical Sciences, Turkey

Mehmet Yetmez, Bulent Ecevit University, Turkey

Dinkar Nandwana, ASM America Inc in Phoenix, AZ (USA)

Hugo Miguel Silva, University of Minho, Portugal

Atef Hamada, Egypt-Japan University of Science and Technology, Egypt

Asma Perveen, Nazarbayev University, Kazakhstan

Chang Seon Shon, Nazarbayev University, Kazakhstan

Kapil Gupta, University of Johannesburg, South Africa

Hira Joshi, Gargi College, University of Delhi, India

M. Gopi Krishna, Acharya Nagarjuna University, India

Marcela Pokusova, Slovak University of Technology in Bratislava, Slovakia