

Preface

This volume contains some selected papers from the 2013 International Conference on Advanced Materials Engineering and Technology (ICAMET 2013) which is to be held in Bandung, Indonesia during November 28-29, 2013, and is organized by Centre of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis. The conference aims to provide a high level international forum for researchers, engineers and scientists to present their new advances and research results in the field of advanced materials engineering and technology.

This volume covered all the aspects of advanced materials engineering and technology, particularly of advanced characterization, biomaterials, biotechnology and life sciences, building materials, coating and surface engineering, composite and polymer materials, optical and photonic materials and any other related topics. All of the papers have been reviewed by more than two expert referees in their relevant topic disciplines. The paper selected for this volume depended on their quality and relevancy to the conference.

The editors hope that this volume will provide the reader a broad overview of the latest advances in the field of advanced materials engineering and technology, and that will be as valuable reference source for further research.

The editors would like to express their sincere appreciations and thanks to all the committee members of the ICAMET 2013 for their tremendous efforts. Without their dedication, it was impossible to have a successful ICAMET 2013 and a high quality volume of the conference proceedings. Thanks also to Trans Tech Publications for producing this volume. Finally, the editors would like to thank all the authors for their contribution to this valuable volume.

Mohd Mustafa Al Bakri Abdullah
Liyana Jamaludin
Alida Abdullah
Rafiza Abdul Razak
Kamarudin Hussin

Universiti Malaysia Perlis, MALAYSIA

November, 2013

2013 International Conference on Advanced Materials Engineering and Technology (ICAMET 2013)

Co-organized by

King Abdul Aziz City Science & Technology (KACST), Kingdom Saudi Arabia

Petra Christian University, Indonesia

University of Bahrain, Isa Town, Bahrain

Faculty of Materials Science and Engineering, Gheorghe Asachi Technical University of Iasi, Romania

International Advisory Board

Prof. Dr. Petrica Vizureanu, Gheorghe Asachi Technical University of Iasi, Romania

Prof. Dr. Mohammed Binhussain, King Abdul Aziz City Science & Technology (KACST), Kingdom Saudi Arabia

Prof. Dr. Ali H. Reshak, South Bohemia University, Czech Republic

Scientia Prof. Dr. Veena Sahajwalla, University of New South Wales (UNSW), Australia

Prof. Dr. Azmi Rahmat, University of Malaysia Perlis (UniMAP), Malaysia

Assoc. Prof. Dr. Andrei Victor Sandu, Gheorghe Asachi Technical University of Iasi, Romania

Assoc. Prof. Dr Manoj Gupta, National University of Singapore (NUS), Singapore

Associate Professor Dr. Kazuhiro Nogita, The University of Queensland, Australia

Dr. Ir. Djwantoro Hardjito, Petra Christian University, Indonesia

Dr. Parames Kamhangrittirong, Kasetsart University, Thailand

Ing. Dr Ivana Perna, Institute of Rock Structure and Mechanics, Academy of Science, Czech Republic

Conference Organization

Honorary – Chair

Prof. Dr. Kamarudin Hussin, University Malaysia Perlis (UniMAP), Malaysia

Conference Chairman

Engr. Mohd Mustafa Al Bakri Abdullah, University Malaysia Perlis (UniMAP), Malaysia

Conference Co-Chairman

Dr. Luqman Musa, University Malaysia Perlis (UniMAP), Malaysia

Technical and Organizing Committee

Assoc. Prof Che Mohd Ruzaidi Ghazali, University Malaysia Perlis (UniMAP), Malaysia

Assoc. Prof. Dr. Khairul Nizar Ismail, University of Malaysia Perlis (UniMAP), Malaysia

Assoc. Prof. Dr. Ir. Salmah Husseinsyah, University of Malaysia Perlis (UniMAP), Malaysia

Dr. Supri A Ghani, Universiti Malaysia Perlis (UniMAP), Malaysia

Dr. Nik Noriman Zulkepli, Universiti Malaysia Perlis (UniMAP), Malaysia

Dr. Mohd Nazree Derman, Universiti Malaysia Perlis (UniMAP), Malaysia

Dr. Zuraidawani Che Daud, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Mohd Arif Anuar Mohd Salleh, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Liyana Jamaludin, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Rafiza Abdul Razak, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Alida Abdullah, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Zarina Yahya, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Mohammad Tamizi Selimin, University of Malaysia Perlis (UniMAP), Malaysia

Engr. Faizul Che Pa, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Ruhiyuddin Mohd Zaki, Universiti Malaysia Perlis (UniMAP), Malaysia

Engr. Norazian Mohamed Noor, Universiti Malaysia Perlis (UniMAP), Malaysia

Secretariat

Mr. Muhammad Faheem Mohd Tahir

Mr. Muhd Izzat Ahmad

Mr. Mohd Hakam Hasan

Reviewer List

Prof Dr Fauziah Ahmad, Universiti Sains Malaysia (USM)

Dr Delsye Teo Ching Lee, Universiti Malaysia Sarawak (Unimas)

Dr Ir Djwantoro Hardjito, Petra Christian University (PCU)

Dr Nik Ahmad Nizam Nik Malek, Universiti Teknologi Malaysia (UTM)

Assoc Prof Dr Ida Idayu Muhammad, Universiti Teknologi Malaysia (UTM)

Dr Zarina Zakaria, Universiti Malaysia Perlis (UniMAP)

Dr Nafisah Mohd Isa@Osman, Universiti Teknologi Mara (UiTM)

Dr Sufizar Ahmad, Universiti Tun Hussein Onn (UTHM)

Dr Muhamad Saifuldin Abd Rahman, Universiti Malaysia Perlis, (UniMAP)

Dr Ahmad Razlan Yusoff, Universiti Malaysia Pahang (UMP)

Prof Jaharah Ab Ghani, Universiti Kebangsaan Malaysia (UKM)

Assoc Prof Dr Manoj Gupta, National University of Singapore

Dr Anika Zafiah Mohd Rus, Universiti Tun Hussein Onn (UTHM)

Dr Jariah Mohamad Juoi, Universiti Teknikal Malaysia Melaka (UTEM)

Assoc Prof Dr Ir Salmah Husseinsyah, Universiti Malaysia Perlis (UniMAP)

Assoc Prof Dr Supri Abd Ghani, Universiti Malaysia Perlis (UniMAP)

Dr Azlin Fazlina Osman, Universiti Malaysia Perlis (UniMAP)

Dr Phak Len Al Eh Kan, Universiti Malaysia Perlis (UniMAP)

Dr Norainiza Saud, Universiti Malaysia Perlis (UniMAP)

Assoc Prof Dr Andre Victor Sindhu, Gheorghe Asachi Technical University of Iasi, Romania

Dr Rizalafande Che Ismail, Universiti Malaysia Perlis (UniMAP)

Dr Mohd Danial Ibrahim, Universiti Malaysia Sarawak (Unimas)

Dr Wan Khairunizam Wan Ahmad, Universiti Malaysia Perlis (UniMAP)

Dr Dewi Suriyani Che Halin, Universiti Malaysia Perlis (UniMAP)

Prof Dr Azmi Rahmat, Universiti Malaysia Perlis (UniMAP)

Dr Zuraidawani Che Daud, Universiti Malaysia Perlis (UniMAP)

Dr Pung Swee Yong, Universiti Sains Malaysia (USM)

Assoc Prof Che Mohd Ruzaidi Ghazali, Universiti Malaysia Perlis (UniMAP)

Dr Firuz Zainuddin, Universiti Malaysia Perlis (UniMAP)

Dr Irwana Nainggolan, Universiti Malaysia Perlis (UniMAP)
Dr Sam Sung Ting, Universiti Malaysia Perlis (UniMAP)
Dr Sharifah Shahnaz Syed Bakar, Universiti Malaysia Perlis (UniMAP)
Dr Nik Noriman Zulkepli, Universiti Malaysia Perlis (UniMAP)
Dr Rozyanty Abd Rahman, Universiti Malaysia Perlis (UniMAP)
Assoc Prof Ahmad Syukri Yahya, Universiti Sains Malaysia (USM)
Mr Mohamad Mat Noor, Universiti Malaysia Pahang (UMP)
Engr. Muhammad Jabir Suleiman@Ahmad (AMREC, SIRIM Berhad)
Engr. Mohd Mustafa Al Bakri Abdullah, Universiti Malaysia Perlis (UniMAP)
Engr. Ruhiyuddin Mohd Zaki, Universiti Malaysia Perlis (UniMAP)
Engr. Faizul Che Pa, Universiti Malaysia Perlis (UniMAP)
Engr. Mohd Arif Anuar Mohd Salleh, Universiti Malaysia Perlis (UniMAP)
Engr. Liyana Jamaludin, Universiti Malaysia Perlis (UniMAP)
Engr. Rafiza Abdul Razak, Universiti Malaysia Perlis (UniMAP)
Engr. Zarina Yahya, Universiti Malaysia Perlis (UniMAP)
Engr Alida Abdullah, Universiti Malaysia Perlis (UniMAP)
Engr Norazian Mohamed Noor, Universiti Malaysia Perlis (UniMAP)