

## Preface

We are pleased to have an opportunity to thank all of our contributors from various parts of the world who took part in the International Conference on Advanced Materials Characterization Techniques (AMCT 2019), held at the Putra Regency Hotel, Kangar, Perlis, Malaysia from 23<sup>rd</sup> to 24<sup>th</sup> July 2019. AMCT 2019, jointly organized by Universiti Malaysia Perlis (UniMAP) and X-ray Application Malaysia of Malaysian Nuclear Society (XAPP-MNS-Malaysia) as main organizers, Malaysian Nuclear Agency (Nuclear Malaysia) and seven others as co-organizer of this event.

A total of 119 scientific papers (oral and poster) were presented during AMCT 2019, and the Organizing Committee was honoured to host total of 150 participants from around the globe. The topics presented in this conference are associated to the current research and development especially in the advancement of materials characterization and related techniques. As a direct result from the conference, we are delighted to have selected high quality peer-reviewed manuscripts, to be published in Materials Science Forum 2020 by Trans Tech Publication Ltd. Peer-reviewing, as well as selecting various presentations (oral or poster), given on the topic of choice by presenters shall ensure high standards in terms of science and dissemination. With this, we believe that the integrity of the scientific contributions in AMCT 2019 can be endorsed and consequently improved further in the future editions.

Finally, we would like to extend our invitation to all scientists, researchers, and sponsors in this field, plus AMCT 2019 participants, to participate in the coming AMCT 2021. We hope to be able to prove a strong platform to present good quality industrial and academic research, provide a showcase for latest equipment, a chance to research collaborations, plus the opportunity to publish in a similarly high quality indexed publication.

### Guest Editor

Mr. Ruhiyuddin Mohd Zaki (Universiti Malaysia Perlis, UniMAP) - Chief  
Professor Dr. Zainal Arifin Ahmad (Universiti Sains Malaysia)  
Associate Professor Dr. Khairul Rafezi Ahmad (Universiti Malaysia Perlis, UniMAP)  
Associate Professor Dr. Khairul Nizar Ismail (Universiti Malaysia Perlis, UniMAP)  
Associate Professor Ts. Dr. Mohd Sobri Idris (Universiti Malaysia Perlis, UniMAP)  
Ts. Dr. Faizul Che Pa (Universiti Malaysia Perlis, UniMAP)  
Dr. Mohd Fitri Mohamad Wahid (Universiti Malaysia Perlis, UniMAP)  
Dr. Abdul Haqi Ibrahim (Universiti Malaysia Perlis)  
Mr. Murizam Darus (Universiti Malaysia Perlis, UniMAP)  
Mrs. Noorina Hidayu Jamil (Universiti Malaysia Perlis, UniMAP)  
Mr. Ts Wan Mohd Arif W. Ibrahim (Universiti Malaysia Perlis, UniMAP)  
Mr. Mohd Zaheruddin Kasmuin (Universiti Malaysia Perlis)

# **Committees**

## **Steering Committee of XAPP**

### **Chairman**

Prof. Dr. Zainal Arifin Ahmad (Universiti Sains Malaysia)

### **Deputy Chairman**

Prof. Dr. Fauziah Hj. Abdul Aziz

### **Secretary**

Assoc. Prof. Dr. Khairul Nizar Ismail (Universiti Malaysia Perlis)

### **Assistant Secretary**

Ahmad Khairulikram Zahari (Malaysian Nuclear Agency)

### **Treasurer**

Ts. Dr. Yusof Abdullah (Malaysian Nuclear Agency)

### **Committee Members**

Dr. Meor Yusoff Meor Sulaiman (Fenomena Inovatif)

Prof. Dr. Ambar Yarmo (Universiti Kebangsaan Malaysia)

Dr. Badrol Ahmad (Damask Materials Solution Sdn. Bhd.)

Assoc. Prof. Dr. Khairul Rafezi Ahmad (Universiti Malaysia Perlis)

Assoc. Prof. Dr. Hasan Zuhudi Abdullah (Universiti Tun Hussein Onn Malaysia)

Dr. Norazharuddin Shah Abdullah ((Universiti Sains Malaysia)

Dr. Ahmad Zahirani Ahmad Azhar (Universiti Islam Antarabangsa Malaysia)

Dr. Muhammad Azwadi Sulaiman (Universiti Malaysia Kelantan)

Dr. Cik Rohaida Che Hak (Malaysian Nuclear Agency)

Dr. Hishamuddin Husain (Malaysian Nuclear Agency)

Dr. Roshasnorlyza Hazan (Malaysian Nuclear Agency)

Dr. Wan Fahmin Faiz Wan Ali (Universiti Teknologi Malaysia)

Dr. Nik Akmar Rejab (Universiti Sains Malaysia)

Dr. Muhamad Faiz Md Din (Universiti Pertahanan Malaysia)

Dr. Shah Rizal Kasim (Universiti Sains Malaysia)

Dr. Khairul Anuar Shariff (Universiti Sains Malaysia)

Dr. Ainun Rahmahwati Ainuddin @ Nordin (Universiti Tun Hussein Onn Malaysia)

Dr. Fakroul Ridzuan Hashim (Universiti Pertahanan Malaysia)

## **Organizing Committee of AMCT 2019**

### ***Patron***

Prof. Ir. Ts. Dr. R. Badlishah Ahmad  
(Vice Chancellor of Universiti Malaysia Perlis)

### ***Advisor***

Prof. Dr. Zainal Arifin Ahmad (Chairman of XAPP-MNS)  
Prof. Dr. Uda Hashim (Universiti Malaysia Perlis)  
Assoc. Prof. Ts. Dr. Mohd Firdaus Omar (Universiti Malaysia Perlis)

### ***Chairman***

Assoc. Prof. Dr. Khairrel Rafezi Ahmad (Universiti Malaysia Perlis)

### ***Honorary Secretary***

Assoc. Prof. Dr. Khairul Nizar Ismail (Universiti Malaysia Perlis)

### ***Secretary***

Ts. Dr. Faizul Che Pa (Universiti Malaysia Perlis)

### ***Assistant Secretary***

Mohd Zaheruddin Kasmuin (Universiti Malaysia Perlis)  
Syarifah Syaimaa Syed Hamzah (Universiti Malaysia Perlis)

### ***Honorary Treasurer***

Ts. Dr. Yusof Abdullah (Malaysian Nuclear Agency)

### ***Treasurer***

Ts. Wan Mohd Arif W. Ibrahim (Universiti Malaysia Perlis)

### ***Assistant Treasurer***

Ts. Noorina Hidayu Jamil (Universiti Malaysia Perlis)

### ***Secretariat***

Mohd Zaheruddin Kasmuin (Universiti Malaysia Perlis)

### ***Technical Program Chair***

Ruhiyuddin Mohd Zaki (Universiti Malaysia Perlis)

### ***Scientific Committee & Publication***

Assoc. Prof. Ts. Dr. Mohd. Sobri Idris (Universiti Malaysia Perlis)  
Dr. Ahmad Zahirani Bin Ahmad Azhar (Universiti Islam Antarabangsa Malaysia)  
Dr. Norazharuddin Shah Bin Abdullah (Universiti Sains Malaysia)  
Mr. Ahmad Khairulikram Bin Zahari (Malaysian Nuclear Agency)  
Dr. Shah Rizal Bin Kasim (Universiti Sains Malaysia)  
Dr. Khairul Anuar Bin Shariff (Universiti Sains Malaysia)

### ***Sponsorship***

Ts. Wan Mohd Arif W. Ibrahim (Universiti Malaysia Perlis)  
Prof. Dr. Fauziah Binti Hj. Abdul Aziz (Universiti Pertahanan Malaysia)  
Prof. Dr. Ambar Bin Yarmo (Universiti Kebangsaan Malaysia)  
Ts. Dr. Yusof Bin Abdullah (Malaysian Nuclear Agency)  
Dr. Cik Rohaida Binti Che Hak (Malaysian Nuclear Agency)  
Dr. Meor Yusoff Bin Meor Sulaiman (Fenomena Inovatif)  
Dr. Badrol Ahmad (Damascus)

### ***Technical, Publicity & Website***

Murizam Darus (Universiti Malaysia Perlis)  
Assoc. Prof. Dr. Muhammad Azwadi Sulaiman (Universiti Malaysia Kelantan)  
Dr. Wan Fahmin Faiz Wan Ali (Universiti Teknologi Malaysia)  
Dr. Nik Akmar Rejab (Universiti Sains Malaysia)

### ***Exhibition & Competition***

Dr. Mohd. Fitri Wahid (Universiti Malaysia Perlis)  
Assoc. Prof. Dr. Hasan Zuhudi Bin Abdullah (Universiti Tun Hussein Onn Malaysia)  
Dr. Roshasnorlyza Binti Hazan (Malaysian Nuclear Agency)  
Dr. Hishamuddin Bin Hussin (Malaysian Nuclear Agency)  
Dr. Ainun Rahmahwati Binti Ainuddin @ Nordin (Universiti Tun Hussein Onn Malaysia)

### ***Protocol, Hospitality and Transportation***

Dr. Muhamad Faiz Md Din (Universiti Pertahanan Malaysia)  
Ts. Noorina Hidayu Jamil (Universiti Malaysia Perlis)  
Murizam Darus (Universiti Malaysia Perlis)

### ***Special Task***

Dr. Abdul Haqi Ibrahim (Universiti Malaysia Perlis)  
En. Mohamad Shabudin Mohd Noor (Universiti Malaysia Perlis)

### ***Editorial Board***

Ruhiyuddin Mohd Zaki (Universiti Malaysia Perlis)  
Prof. Dr. Zainal Arifin Ahmad (Universiti Sains Malaysia)  
Assoc. Prof. Dr. Khairul Rafezi Ahmad (Universiti Malaysia Perlis)  
Assoc. Prof. Dr. Khairul Nizar Ismail (Universiti Malaysia Perlis)  
Ts. Dr. Faizul Che Pa (Universiti Malaysia Perlis)  
Dr. Mohd. Fitri Wahid (Universiti Malaysia Perlis)  
Assoc. Prof. Ts. Dr. Mohd. Sobri Idris (Universiti Malaysia Perlis)  
Ts. Wan Mohd Arif W. Ibrahim (Universiti Malaysia Perlis)  
Ts. Noorina Hidayu Jamil (Universiti Malaysia Perlis)  
Mohd Zaheruddin Kasmuin (Universiti Malaysia Perlis)  
Murizam Darus (Universiti Malaysia Perlis)

### ***Advisory***

Prof. Dr. R Vasant Kumar (University of Cambridge, United Kingdom)  
Scientia Prof. Dr. Veena Sahajwalla (University New South Wales, Australia)  
Prof. Dr. Kazuhiro Nogita (University of Queensland, Australia)  
Prof. Dr. Esah Bte Hamzah (Universiti Teknologi Malaysia, Malaysia)  
Prof. Dr. Zainal Arifin Ahmad (Universiti Sains Malaysia, Malaysia)  
Ts. Dr. Yusof Abdullah (Malaysian Nuclear Agency, Malaysia)

## Sponsors

The organizing committee of the AMCT2019 wishes to acknowledge the following companies and organizations for the generous contributions and supports towards the success of this conference.

