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IMAC

International Workshop on
**Materials and Advanced
Characterization 2021**

NBRI CONFERENCE

REPORT BOOK

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INTRODUCTION

International Workshop on Materials and Advanced Characterization (IMAC) 2021 is one of the most important event to discuss the current issue of the materials and advanced characterization for achieving Sustainable Development Goals target.

The workshop has been organized by the National Battery Research Institute (NBRI) in collaboration with the Queen Mary University of London (QMUL), Material Research Society Indonesia (MRS-INA), International Union of Material Research Societies (IUMRS), and Indonesian Neutron Scattering Society (INSS).

The IMAC 2021 has brought together the experts on material and advanced characterization from all over the world. the researchers from university and institution, practitioners from industry, and other stakeholders that related to the issue.

This workshop has succeeded to deliver the output and outcome that give a beneficial for all parties. Therefore, the target of sustainable development goals through materials technology can be achieved.

Thank you so much for all of your contributions.

Founder of National Battery Research Institute (NBRI), President of Material Research Society-Indonesia (MRS-INA), and President of Indonesian Neutron Scattering Society (INSS), Indonesia



Prof. Dr. rer. nat. Evvy Kartini
Chair

Researcher of Research Center for Chemistry, National Research and Innovation Agency (BRIN) and Member of the Indonesian Neutron Scattering Society (INSS)



Dr. Indri Badria Adilina
Vice Chair

IMAC 2021 Secretariat:

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International School Lot. 2 No. 8
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Website: <https://www.nbri-events.org/>

BACKGROUND

The Material Research Society Indonesia (“MRS-INA”) was established on April 15, 2011. Since July 2017 becomes adhering bodies of the International Union of Materials Research Society (IUMRS). The goals of MRS-INA are to promote the materials research activities in Indonesia into the International forum, open national and international networking in the field of materials research, and to promote its applications in various areas of industries. MRS-INA is also responsible to educate and train young researchers or students about the materials knowledge and characterizations.

National Battery Research Institute (NBRI) is a spin-off the MRS-INA. It is a platform that brings together scientists, academicians, industry partners, the government and all stakeholders that focus on battery technology for both Electric Vehicles and Renewable Energies. The NBRI was established as center of excellence on battery and renewable energy foundation in December 07th, 2020 with the support by the UK Government’s Global Challenge Research Fund (GCRF).

The Indonesian Neutron Scattering Society (INSS) is a professional organization focus on material characterization by advanced technology such as neutron scattering, high energy accelerator, synchrotron radiation, and high energy x-ray. It was established in 2015 then became the member of Asian Oceania Neutron Scattering Association (AONSA).

Since their establishment, those societies (MRS-INA, NBRI, and INSS) have experienced on conducting the international conference, international workshop and school, focus group discussion, such as ICMST 2010 & 2014, MRS-INA CNC 2017 in Yogyakarta, [ICA-IUMRS 2018](#) in Bali, [ICAMT-ICMR 2019](#) in Bogor, [International Battery School \(IBS\) 2021](#), [Climate Challenge Workshop 2021](#), [International Conference on Battery for Renewable Energy and Electric Vehicles \(ICB-REV\) 2021](#). These events were conducted in order to promote Indonesian research activities into the international forum. On the other hand, we also invited the international world class speakers, into the event in order to share their knowledges and understand the current state of the technology in the world. Furthermore, it is also important to apply the invention to the market by having cooperation with industry.

This year, we have organized one prestigious event namely the International Workshop on Materials and Advanced Characterization (IMAC) 2021. The purpose of the IMAC 2021 has enhanced the capacity of participants on materials and advanced characterization skill.

THEME

The theme for the International Workshop on Material and Advanced Characterization (IMAC) 2021 is ***“Neutron and Synchrotron Science as Powerful Tools in Materials Research for Sustainable Development Goals.”***

TIME AND VENUE

Time: December 01st -02nd, 2021

Venue: Conducting Online (Indonesia)

LEARNING TOPICS

1. General overview of materials science.
2. General overview of advanced characterization techniques.
3. Hard matter (porous materials, catalysts, crystals, solid magnets, solid materials).
4. Soft matter (colloid science - surfactants, polymers, drug delivery, and protein).
5. Application of neutron, muon, and synchrotron techniques for materials research.

IMAC 2021 AGENDA

Day 1 (Wednesday 1st December 2021)

No	Time				Session	Length	Theme	Speakers
	Indonesia	Japan/ Korea	Australia	UK				
1	08.45 – 09.00	10.45 – 11.00	12.45 – 13.00	01.45 – 02.00	Zoom meeting open	15 mins		
2	09.00 – 09.05	11.00 – 11.05	13.00 – 13.05	02.00 – 02.05	Opening by MC	5 mins		MC
Morning Session Moderator								Dr. Indri Badria Adilina (National Innovation and Research Agency)
3	09.05 – 09.25	11.05 – 12.15	13.05 – 13.25	02.05 – 02.25	Opening remarks by Chairman of The National Research and Innovation Agency (BRIN)	20 mins	Neutron and Synchrotron Facilities at National Research and Innovation Agency (BRIN)	Dr. Edy Giri Rachman Putra
4	09.25 – 09.35	11.25 – 11.35	13.25 – 13.35	02.25 – 02.35	Opening and Introduction to MRS- INA/INSS/NBRI	10 mins	The National Battery Research Institute Introduction	Prof. Dr. rer. nat. Evvy Kartini
5	09.35 – 11.05	11.35 – 13.05	13.35 – 14.05	02.35 – 04.05	Training Session (1) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Preparation and catalysis of base metal oxide nanocluster catalysts: Determination of active species by using X-ray absorption fine structure	Prof. Nobuyuki Ichikuni (Chiba University)
6	11.05 – 12.35	13.05 – 14.35	14.05 – 16.35	04.05 – 05.35	Training Session (2) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Local stucture and defect state studied using synchrotron X – ray absorbtion and photoemission spectroscopy	Prof. Dr. Darminto, MS. & Retno Asih, Ph.D. (Institut Teknologi Sepuluh November)

7	12.35 – 14.00	14.35 – 16.00	16.35 – 18.00	05.35 – 07.00	Lunch Break	145 min		
Afternoon Session Moderator								Prof. Dr. Agustinus Agung Nugroho Sulistyo Hutomo (Institute Technology of Bandung)
8	14.00 – 15.30	16.00 – 17.30	18.00 – 19.30	07.00 – 08.30	Training Session (3) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Inelastic neutron scattering and its applications in catalysis	Dr. Stewart Parker (STFC ISIS)
9	15.30 – 17.00	17.30 – 19.00	19.30 – 21.00	08.30 – 10.00	Training Session (4) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Structural Characterization of Complex Materials of Industrial Importance: Case Studies using Small and Ultra Small Angle Scattering at ACNS, ANSTO	Dr. Jitendra Matta (ANSTO)
10	17.00 – 17.05	19.00 – 19.05	21.00 – 21.05	10.00 – 10.05	Closing Day 1			MC

Day 2 (Thursday 2nd December 2021)

No	Time				Session	Length	Theme	Speakers
	Indonesia	Japan/ Korea	Australia	UK				
1	08.45 – 09.00	10.45 – 11.00	12.45 – 13.00	01.45 – 02.00	Zoom meeting open	15 mins		

Morning Session Moderator							Dr. Indri Badria Adilina (National Innovation and Research Agency)	
2	09.00 – 09.50	11.00- 11.50	13.00 – 13.50	02.00-02.50	Training Session (5) <i>5 min speaker introduction, 45 min presentation,</i>	50 mins	Understanding the lithium ion inside the battery material by neutron	Prof. Dr. rer. nat. Evvy Kartini (MRS-INA/INSS/NBRI)
3	09.50 – 10.40	11.50 – 12.40	13.50 – 14.40	02.50 – 03.40	Training Session (6) <i>5 min speaker introduction, 45 min presentation</i>	50 mins	Visualizing lithium-ion in battery materials using X-Ray and Neutron Diffraction	Dr. Maykel Manawan (Universitas Pertahanan)
4	10.40 – 11.00	12.40- 13.00	14.40- 15.00	03.40-04.00	<i>15 min Q&A discussion, 5 min certificate of appreciation</i>	20 mins	Topic (5) and (6)	Prof. Dr. rer. nat. Evvy Kartini (MRS-INA/INSS/NBRI) Dr. Maykel Manawan (Universitas Pertahanan)
5	11.00 – 12.30	13.00 – 14.30	15.00 – 16.30	04.00 – 05.30	Training Session (7) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Micelle-Assisted and Covalent Bonding-Mediated Formation of Nanoparticle Superlattices	Prof. Sung-Min Choi (KAIST)
6	12.30 – 14.00	14.30 – 16.00	16.30 – 18.00	05.30 – 07.00	Lunch Break	150 min		
Afternoon Session Moderator							Nandang Mufti, M.T., Ph.D (State University of Malang)	

7	14.00 – 15.30	16.00 – 17.30	18.00 – 19.30	07.00 – 08.30	Training Session (8) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Quasi-elastic neutron scattering- Biological and soft matter samples	Dr. Mona Sarter (STFC ISIS)
8	15.30 – 17.00	17.30 – 19.00	19.30 – 21.00	08.30 – 10.00	Training Session (9) <i>5 min speaker introduction, 60 min presentation, 20 min Q&A discussion, 5 min certificate of appreciation</i>	90 mins	Shining a Light on Materials Characterisation at the Diamond Light Source	Dr. Anna Kroner (DLS)
9	17.00 – 17.10	19.00 – 19.10	21.00 – 21.10	10.00 – 10.05	Closing by President of MRS-INA/ INSS/NBRI and the Chair of IMAC 2021	10 mins		Prof. Dr. rer. nat. Evvy Kartini (MRS- INA/INSS/NBRI)

SPEAKERS

Opening Remarks



Prof. Dr. rer. nat. Evvy Kartini

(Founder of NBRI, President of MRS-INA, and President of INSS, Indonesia)

"The National Battery Research Institute Introduction"



Dr. Edy Giri Rachman Putra

(Act. Deputy for Human Resources for Science and Technology, BRIN)

"Neutron and Synchrotron Facilities at National Research and Innovation Agency (BRIN)"

Lecturers



Prof. Nobuyuki Ichikuni

(Professor of Graduate School & Faculty of Engineering, Chiba University, Japan)

"Preparation and catalysis of base metal oxide nanocluster catalysts: Determination of active species by using X-ray absorption fine structure"



Prof. Dr. Darminto

(Professor at Physics Department, Institute Technology of Sepuluh Nopember, Indonesia)

"Local structure and defect state studied using synchrotron X – ray absorption and photoemission spectroscopy."



Dr. Stewart Parker

(Science and Technology Facilities Council (STFC) ISIS Neutron and Muon Source, United Kingdom)

"Inelastic neutron scattering and its applications in catalysis"



Dr. Jitendra Matta

(Scientist for Kookaburra (Ultra-Small-Angle Neutron Scattering), ANSTO Australia)

"Structural Characterization of Complex Materials of Industrial Importance: Case Studies using Small and Ultra Small Angle Scattering at ACNS, ANSTO "



Prof. Dr. rer. nat. Evvy Kartini

(Founder of NBRI, President of MRS-INA, and President of INSS, Indonesia)

"Understanding the lithium ion inside the battery material by neutron"



Dr. Maykel Manawan

(Researcher of Indonesian Defense University, Indonesia)

"Visualizing lithium-ion in battery materials using X-Ray and Neutron Diffraction"



Prof. Sung-Min Choi

(Professor in the Department of Nuclear Engineering at the Korea Advanced Institute of Science and Technology (KAIST), South Korea)

"Micelle-Assisted and Covalent Bonding-Mediated Formation of Nanoparticle Superlattices"



Dr. Mona Sarter

(Science and Technology Facilities Council (STFC) ISIS Neutron and Muon Source, United Kingdom)

"Quasi-elastic neutron scattering- Biological and soft matter samples"



Dr. Anna Kroner

(Senior Industrial Liaison Scientist at Diamond Light Source, United Kingdom)

"Shining a Light on Materials Characterization at the Diamond Light Source"

ORGANIZATION

Steering Committee

Prof. Dr. rer. nat. Evvy Kartini	Founder of National Battery Research Institute (NBRI), President of Material Research Society Indonesia (MRS-INA), and President of Indonesian Neutron Scattering Society (INSS), Indonesia
Prof. Alan J Drew	Co-Founder of National Battery Research Institute (NBRI) and Director of the Materials Research Institute, Queen Mary University of London (QMUL), United Kingdom
Prof. Rodrigo Martins	President of International Union of Material Research Societies (IUMRS) and Director of European Academy of Science (EurASc), Portugal
Prof. Ir. Muhammad Nizam, ST., MT.	Coordinator of National Research Priority Mandatory on Energy Storage

Organizing Committee

Chair	Prof. Dr. rer. nat. Evvy Kartini
Vice Chair	Dr. Indri Badria Adilina
Secretary	Shinta Widyaningrum, S.Sos.
Treasury	Adit Triwiguno, SE. Noeraida
Chairman	Prof. Dr. Agustinus Agung Nugroho Sulistyo Hutomo Dr. Indri Badria Adillina Nandang Mufti, M.T., Ph.D
Person in Charge	Muhammad Fakhrudin, ST. Moh. Wahyu Syafi'ul Mubarak, S.Si.
International and National Relation	Muhammad Firmansyah, SE.
Press Conference	Mochamad Subhan Alkyana, S.IP.
IT Design and Social Media	Shafira Ramadhani and Eueggalion Jonathan Ambarita, S.Kom.

GENERAL REPORT

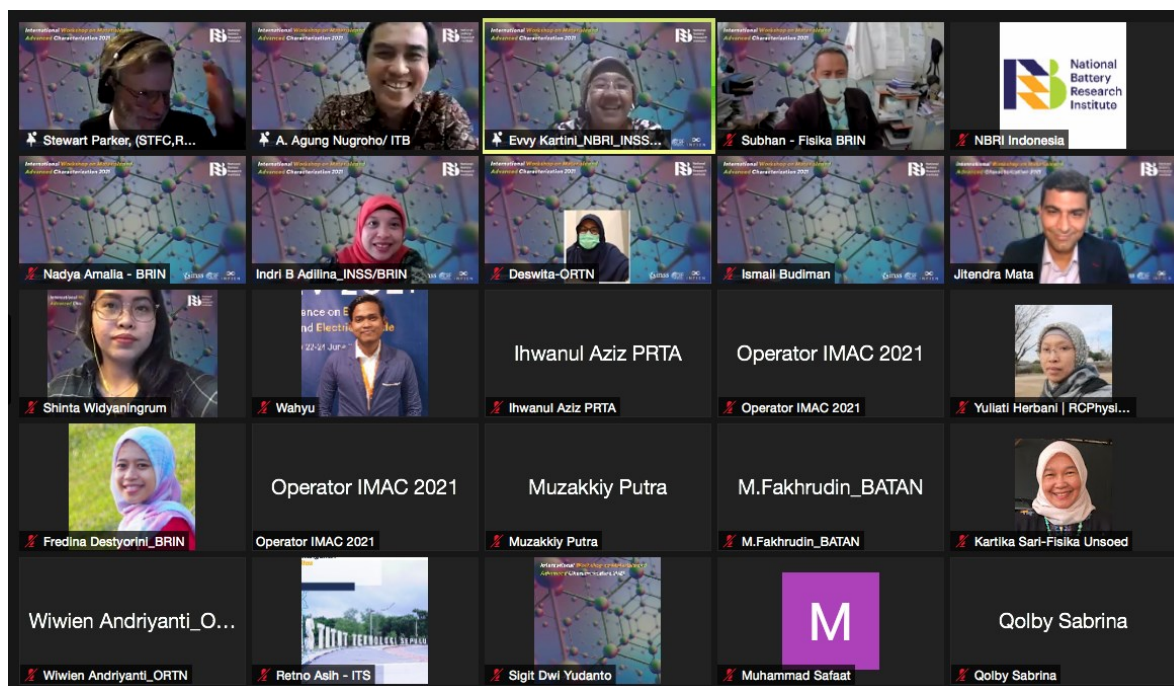


Figure 1. The IMAC 2021

The International Workshop on Materials and Advanced Characterization (IMAC) 2021 has been successfully conducted on 01st – 02nd December, 2021. The IMAC 2021 has been managed fully online due to the covid-19 pandemic situation. This international event has been prepared less five weeks with a solid team. The IMAC 2021 is also part of International Conference on Advanced Material and Technology (ICAMT) 2021. Figure 1 is one of the photo sessions on two days' workshop.

We also thanks to several sponsors that have supported IMAC 2021. International Union of Material Research Societies (IUMRS), PT. Surveyor Indonesia, Material Research Society (MRS) Thailand, and PT. Chandra Asri Petrochemical as bronze sponsors. Queen Mary University of London (QMUL), PT. Infiniti Energi Indonesia, KGC Saintifik, Material Research Society Indonesia (MRS-INA), Indonesian Neutron Scattering Society (INSS), and Asia-Oceania Neutron Scattering Association (AONSA) as supported sponsors. All sponsors logo is shown in figure 2.



Figure 2. The sponsors of IMAC 2021

The total of attendances in two days' workshop has reached 53 participants (more than 20 attendances in every session) from 5 countries. Most of them are from Indonesia (47 participants) followed by United Kingdom (3 participants). Also, a person from Japan, South Korea, and Australia. Figure 3 shows the country participants demographic and figure 4 identifies the country participants exclude Indonesia.

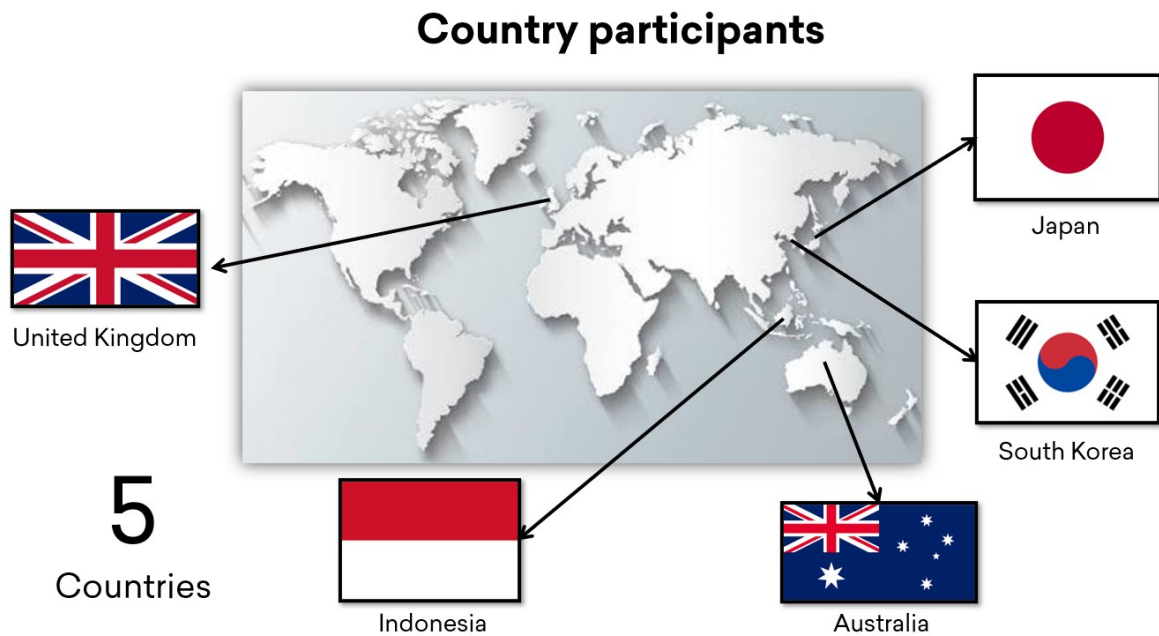


Figure 3. The demographic data of IMAC 2021 participants

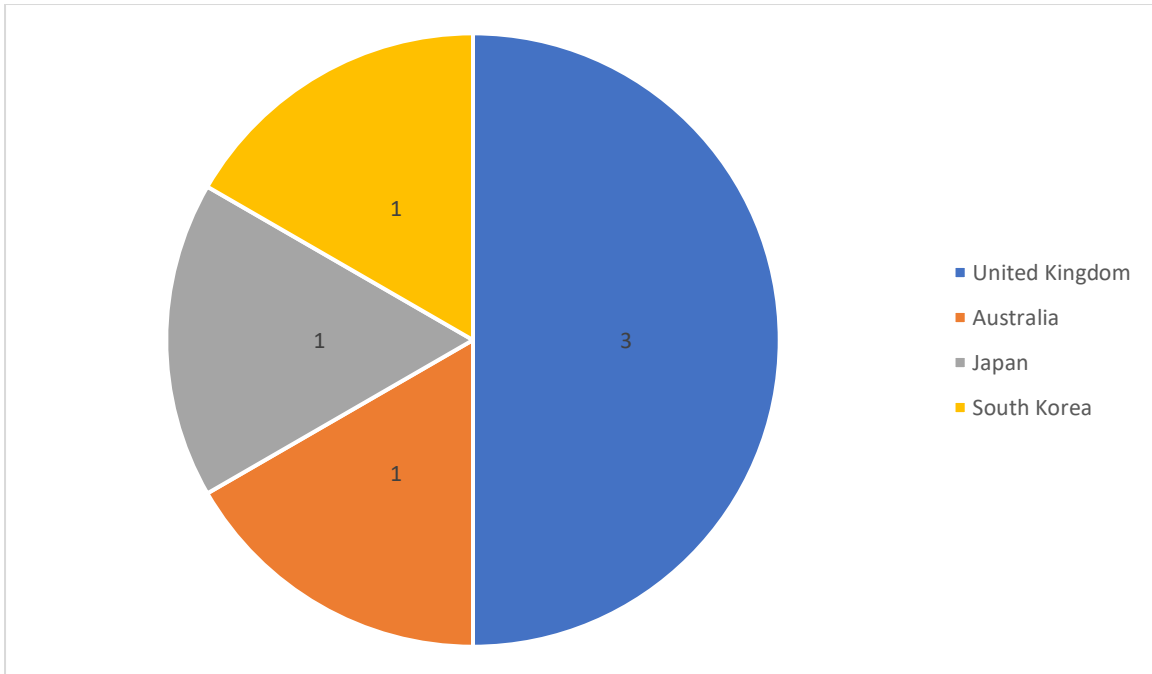


Figure 4. The demographic data of IMAC 2021 participants exclude Indonesia

According to institution background, the participants have come from Research Center, Government, and University which 22 institutions in total. Figure 5 shows each number specifically. And by occupation, IMAC 2021 has covered Indonesian participant, International participant, and Indonesian student. Figure 6 shows the amount of participant in every occupation.

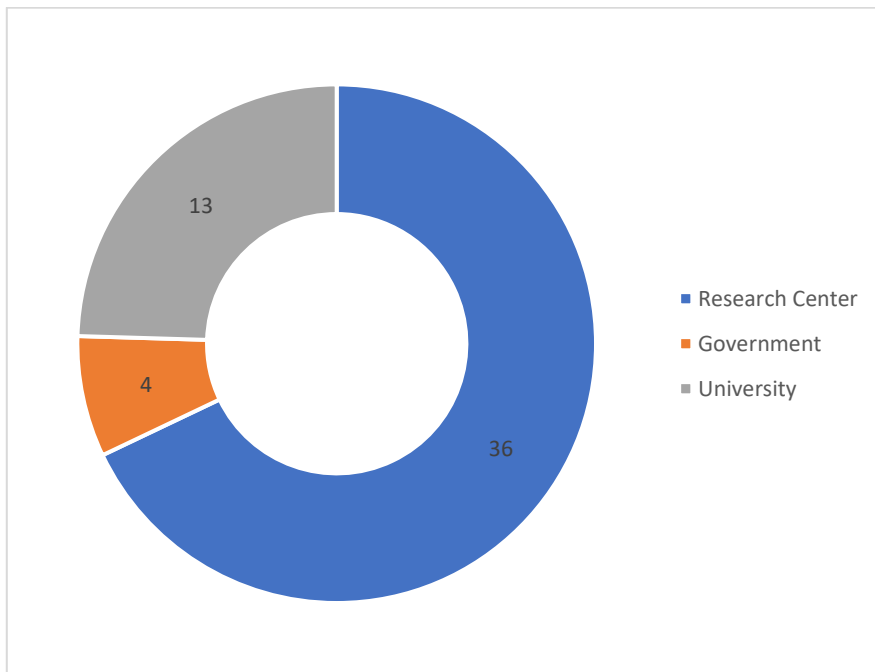


Figure 5. Institution background of IMAC 2021 participants

The list of institutions are as follows:

National Battery Research Institute, Indonesia	Research Center and Technology of Accelerator, National Research and Innovation Agency (BRIN), Indonesia
Research Center and Technology of Advanced Nuclear Material, National Research and Innovation Agency (BRIN), Indonesia	Research Center of Physics, National Research and Innovation Agency (BRIN), Indonesia
Research Center of Chemistry, National Research and Innovation Agency (BRIN), Indonesia	Research Center of Material and Metallurgy, National Research and Innovation Agency (BRIN), Indonesia
Research Center of Biomaterial, National Research and Innovation Agency (BRIN), Indonesia	Research Center of Material Technology, National Research and Innovation Agency (BRIN), Indonesia
Center for Applied Nuclear Science and Technology (PSTNT), BRIN, Indonesia	Institute Technology of Bandung, Indonesia
State University of Malang, Indonesia	Jenderal Soedirman University, Indonesia
WIN Global Young, Indonesia	University of Technology Yogyakarta, Indonesia
Science and Technology Facilities Council (STFC), United Kingdom	Korea Advanced Institute of Science and Technology (KAIST), South Korea
Institute Technology of Sepuluh Nopember (ITS), Indonesia	Kookaburra (Ultra-Small-Angle Neutron Scattering), ANSTO, Australia
Diamond Light Source, United Kingdom	Graduate School & Faculty of Engineering, Chiba University, Japan
UIN Syarif Hidayatullah, Indonesia	Indonesian Defense University, Indonesia

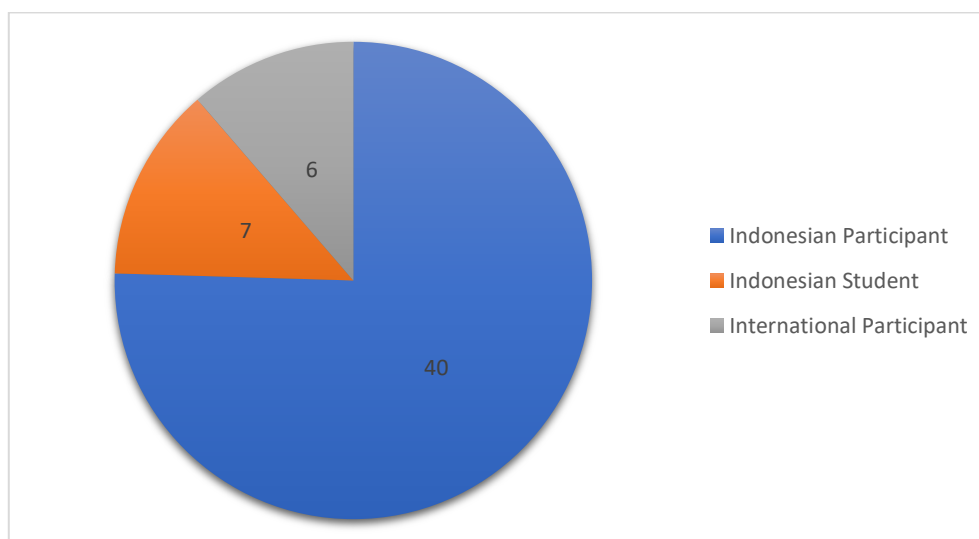


Figure 6. The occupation of IMAC 2021 participants

The Committee also conducted the satisfaction survey in each session of IMAC 2021. According to the result, participants strongly agree that the event is excellently delivered, gives a new insight, and impactful. There are more than 89% of participants chose 5 out of 5 rating scale in each assessment item. And speaking about the participants feedback, the IMAC 2021 received several positive impressions. Some people comment that the event is good enough for the online workshop. Some of them also mentioned about well-prepared event, means that the IMAC 2021 is organized well.

In addition, here are several written impressions and feedbacks along the IMAC 2021 event:

"Great event to improve our skill in advance material characterization."

"Very interesting event. Hopefully it will continue in the future."

"Make it annually event."

"Good event."

"Nice lectures."

"Very good event, with speakers who are experts in their fields. Hopefully the event can be maintained."

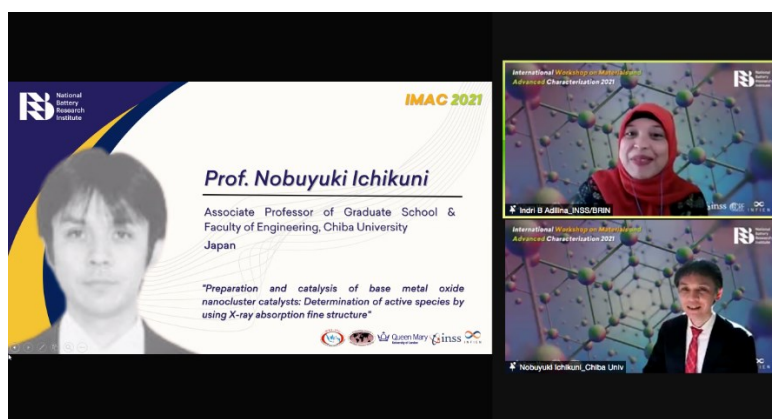
"Make this event as routine event."

SUBSTANTIAL REPORT

The IMAC 2021 was opened by Prof. Dr. rer. nat. Evvy Kartini. She represented a founder of National Battery Research Institute, President of Material Research Society Indonesia (MRS-INA), and President of Indonesian Neutron Scattering Society (INSS). Professor Evvy reported the IMAC 2021 event and introduced the history of NBRI and the role of MRS-INA through that platform during her opening remarks. Afterwards, the Acting Deputy for Human Resources of Science and Technology, National Research and Innovation Agency (BRIN), Dr. Edy Giri Rachman Putra, took the virtual stage to present the opening remarks. He talked about Neutron and Synchrotron Facilities at National Research and Innovation Agency (BRIN).



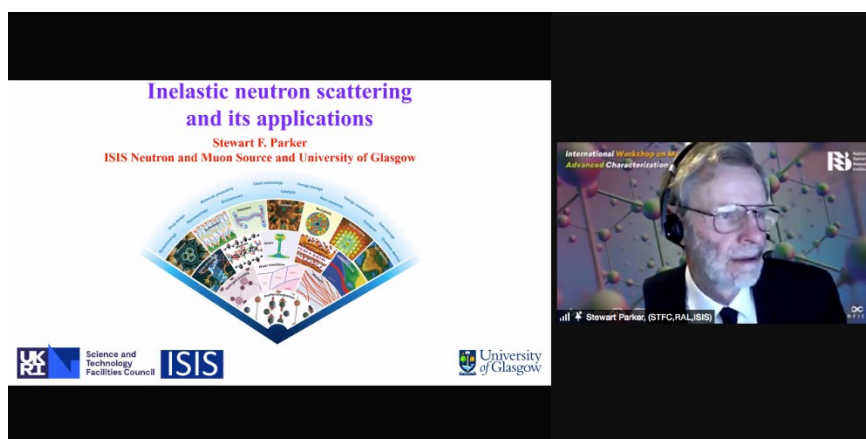
Afterward, the committee conducted pre-test before the participants enrolled in the first day of the workshop. Then, the first speaker took the virtual stage in which belong to Prof. Nobuyuki Ichikuni. He is a Professor of Graduate School & Faculty of Engineering, Chiba University, Japan. Professor Ichikuni presented on Preparation and catalysis of base metal oxide nanocluster catalysts: Determination of active species by using X-ray absorption fine structure.



After intriguing lecture from Prof. Ichikuni, the workshop was continued by Professor Darminto from Institute Technology of Sepuluh Nopember (ITS) Indonesia. He shared the session with his partner, Mrs. Retno Asih, Ph.D. and talked about local structure and defect state studied using synchrotron X – ray absorption and photoemission spectroscopy. The morning session of first day workshop was chaired by Dr. Indri Badria Adilina, a researcher of National Research and Innovation Agency (BRIN), Indonesia.

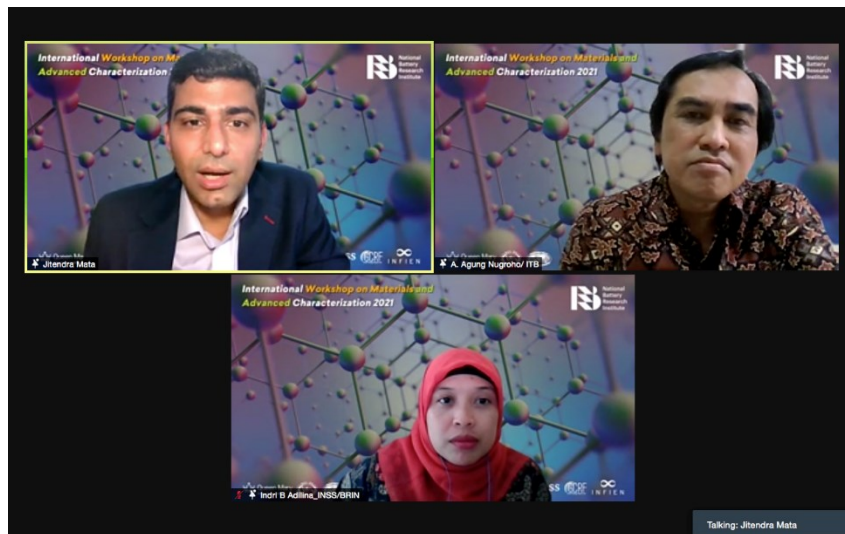


Afternoon session was opened by distinguished chairman, Prof. Dr. Agustinus Agung Nugroho Sulisty Hutomo from Institute Technology of Bandung (ITB), Indonesia. On the third session, IMAC 2021 has Dr. Stewart Parker as distinguished lectures. He is a senior researcher of Science and Technology Facilities Council (STFC), ISIS Neutron and Muon Source, United Kingdom. Doctor Stewart delivered an appealing topic on Inelastic neutron scattering and its applications in catalysis.

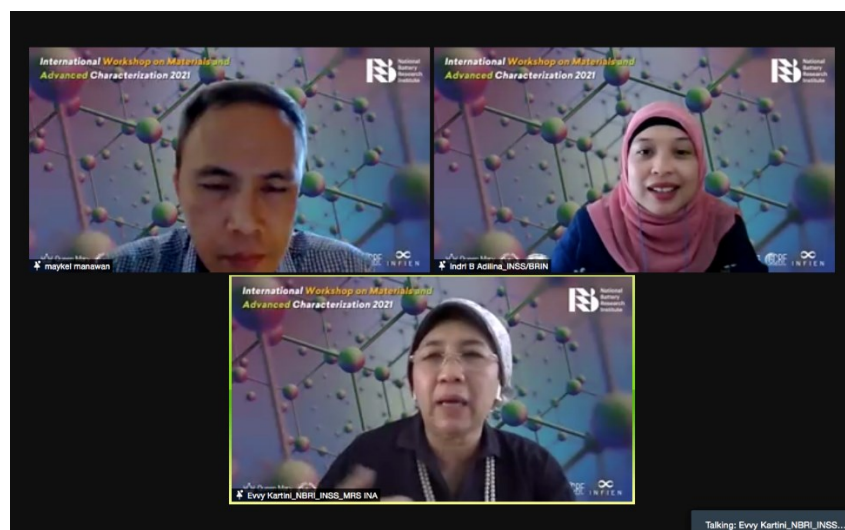


The following distinguished speaker was Dr. Jitendra Matta, the scientist for Kookaburra (Ultra-Small-Angle Neutron Scattering), Australian Nuclear Science and

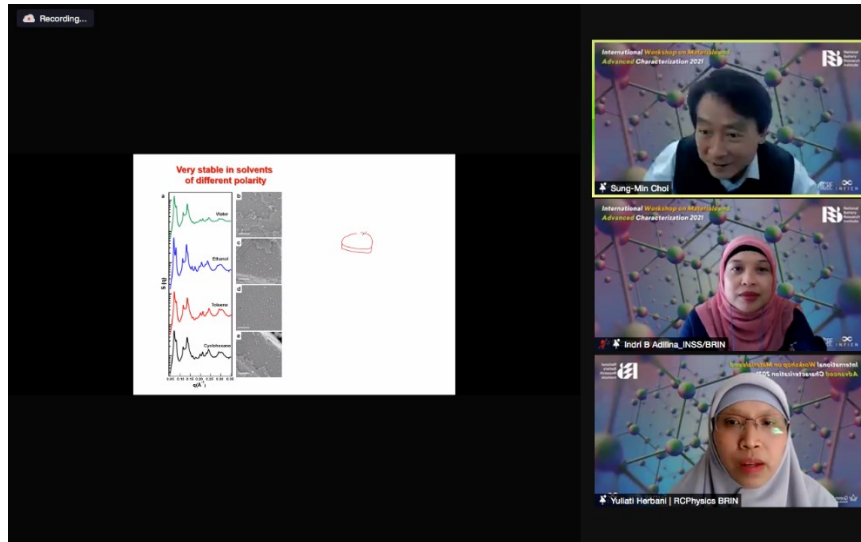
Technology Organization (ANSTO), Australia. He explained about Structural Characterization of Complex Materials of Industrial Importance: Case Studies using Small and Ultra Small Angle Scattering at ACNS, ANSTO. After fascinating discussion, the first day of IMAC 2021 was closed with post-test.



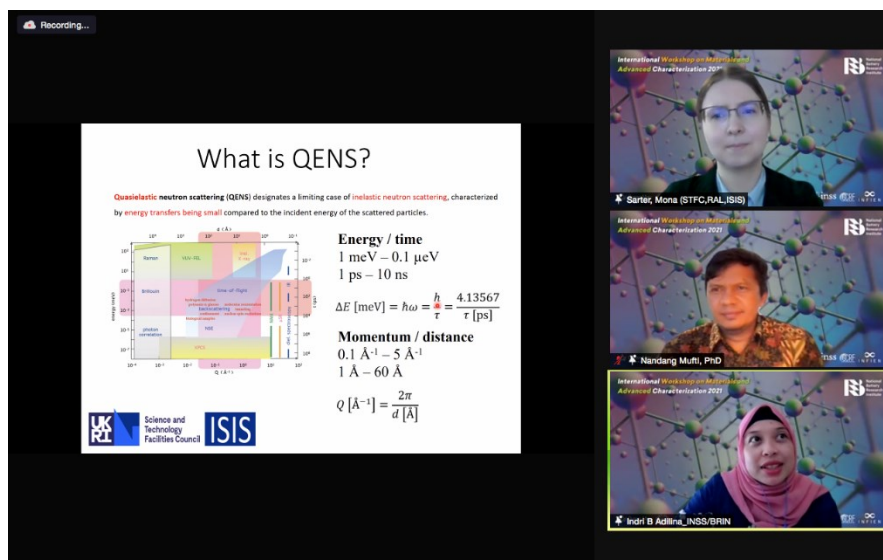
The second day of IMAC 2021 was started with the pre-test. The distinguished chairman was Dr. Indri Badria Adilina as researcher of National Research and Innovation Agency (BRIN), Indonesia. Prof. Dr. rer. nat. Evvy Kartini as founder of National Battery Research Institute (NBRI) took a stage for first lecture session. Professor Evvy is also President of Material Research Society Indonesia (MRS-INA) and Indonesian Neutron Scattering Society (INSS). He introduced the participants on Understanding the lithium ion inside the battery material by neutron. Then, the session was continued by Dr. Maykel Manawan from Indonesian Defense University with technical topic. He explained briefly about Visualizing lithium-ion in battery materials using X-Ray and Neutron Diffraction.



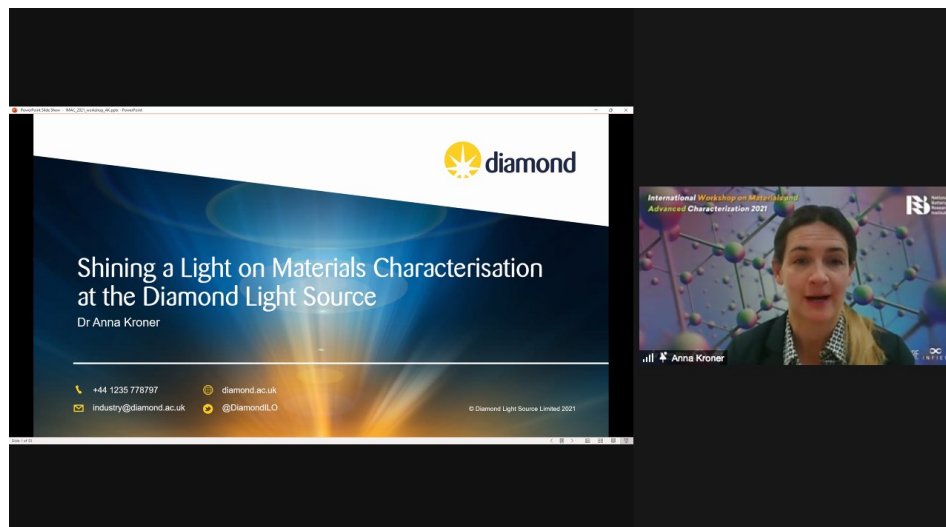
Afterward, the session belonged to Professor in the Department of Nuclear Engineering at the Korea Advanced Institute of Science and Technology (KAIST), South Korea, Professor Sung-Min Choi. The title of his presentation was Micelle-Assisted and Covalent Bonding-Mediated Formation of Nanoparticle Superlattices. It is a promising method for preparing nanoparticle superlattices through mediated formation on covalent bonding.



In afternoon session, the IMAC 2021 had Mr. Nandang Mufti, MT., Ph.D. from State University of Malang, Indonesia as distinguished chairman. He moderated two lectures with distinguished speakers from United Kingdom. First lecturer was Dr. Mona Sarter, as researcher at Science and Technology Facilities Council (STFC) ISIS Neutron and Muon Source, United Kingdom. She delivered Quasi-elastic neutron scattering- Biological and soft matter samples topic.



Afterward, the next session was Dr. Anna Kroner as Senior Industrial Liaison Scientist at Diamond Light Source, United Kingdom. She presented about Shining a Light on Materials Characterization at the Diamond Light Source. Dr. Anna really passionate to talk about her institution. The UK's national synchrotron light source science facility located at the Harwell Science and Innovation Campus in Oxfordshire. Its purpose is to produce intense beams of light whose special characteristics are useful in many areas of scientific research.



Finally, the IMAC 2021 officially closed by Pro. Dr. rer. nat. Evvy Kartini with her memorable closing remarks.

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