



Photo of the 3rd Asia-Oceania Conference on Neutron Scattering in Kenting

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President's Message

By Brendan Kennedy

As one door closes another opens. Many of us just participated in the third AOCNS held in Kenting Twain and hosted by TWNSS. Without exception all the presentations I went to demonstrated the dynamic state of neutron scattering in our region, that is underpinned by the growth in capability. This growth will be accelerated as JRR3 and HANARO resume regular operation over the next couple of years. This growth in capability must be met by a growth in the user community, that can be achieved both by training the next generation of neutron scatterers and by engaging with local industry to establish how we can work with them to use the available neutrons to address important societal goals. During the meeting I also had the honor of presenting the AONSA prize to Professor Mahn Won Kim for his seminal contributions in building Asia-Oceania Neutron Scattering Association and the establishing of the neutron scattering community and facility in Korea.

Now for the future. The next opportunity we will have to gather as a group will be at the International conference on Neutrons Scattering in Argentina July 4-8 2021. Whereas Kenting was reasonably central for all of us, Argentina is remote. If we are going to project our position on the world stage we need to have a strong presence at ICNS-2021, so reserve the dates in your diaries now.

Finally, I am pleased to report that at its last executive

meeting the question of diversity was discussed and the following position approved:

- AONSA strives to achieve gender balance in all its institutions and activities bearing in mind other cultural diversity needs and its existing obligations to geographic and academic discipline representation where appropriate.
- AONSA award committees will have both male and female representation.
- AONSA will ensure reasonable representation of the AOCNS organizing committee will be female and that plenary, keynote and invited speakers together with session chairs will include females.
- Those seeking support from AONSA for, meetings, workshops and schools will have to demonstrate their efforts to address gender balance including targets for gender equality

For ANOSA to achieve these targets it is necessary for each of the member societies to reflect on the diversity of their membership and to proactively target early career researchers to address gender balance. The ball is in your court.

Reports on the 23th AONSA Executive Committee Meeting

The 23rd AONSA Executive Committee Meeting was held on Monday November 18th, 2019, at the Howard Beach Resort Hotel in Kenting, Taiwan, during the AOCNS 2019. In total 27 participants joined the meeting, including twelve Executive Committee (EC) members, nine observers representing neutron facilities in the Asia-Oceania region, and six special observers. Since members and observers from the mainland China could not travel, the video conference call was connected to Beijing and Donguan simultaneously. It worked pretty well and allowed Dongfeng Chen (CARR), Hesheng Chen (IHEP), Yuntao Liu (CARR), Kai Sun (CMRR), and Fangwei Wang (CSNS) to join the meeting with clear voices. The first-timers included Kathleen Wood (ANSTO), who joined on behalf of Tracy Rushmer of ANBUG, Rifai Muslih (BATAN), who were on behalf of Evvy Kartini of INSS, Soo-Hyung Choi (Hongik U) on behalf of Sungkyun Park of KNBUA, and Ko-Wei Lin (Nat. Chung Hsing U) of TWNSS. Wanchuck Woo (KAERI) also join for the first time as the special observer. Ex-Presidents Yasuhiko Fujii (retired) and Sungmin Choi also joined.

Brendan Kennedy opened the 23rd EC meeting by thanking the host and attendees. After the approvals of the agenda and the past minutes followed by the AONSA Office report, Sungil Park (KAERI) report on the 11th AONSA Neutron School which was held in Daejeon, South Korea on August 19 – 23, 2019. Since the number of student applications were unprecedentedly low in this school, the members and observed made long discussions regarding how to promote future neutron schools and make them premier in the region while there are several schools offered by facilities. The opinions put forward include

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providing competition-based scholarships by facilities and societies, reducing the frequency of the AONSA schools, focusing on specialized areas or topics, merging with domestic neutron schools, etc. In the end, Brendan suggested continuing the discussions on this issue through the next EC meetings.

The screening process and results of the 2020 AONSA Young Research Fellow was reported by the vice president Dongfeng Chen from across the sea via network. Out of nine applicants, three candidates with best evaluation results were recommended by the selection committee. The members and facility observers approved the recommendations. The CSNS, ANSTO and J-PARC accepted one young research fellow each.

Noting that this was to be the last EC meeting as the president of AONSA himself, Brendan Kennedy made a summary report of his Presidential activities including presenting AONSA activities at the ECNS2019 and meetings with the presidents of NSSA (Despina Louca) and ENSA (Christian Alba-Simionesco). Inspired by their meetings, he proposed the EC to consider a new award for early-career researchers. He also put forward diversity proposals in the AONSA to promote gender balance among others.

The proposals are going to be reviewed by members and observers before putting up on the AONSA webpage. Lastly, he acknowledged the failure to announce the Call for Proposal to host the AOCNS 2023 in due time, and the announcement would be made immediately so that the biddings and decision can be made during the next EC meeting in May 2020. As the secretary of AONSA, I admit that the blame in fact is on myself. The announcement was sent out to the members and observers before the closing of the

News letter from AONSA

The recommendations for the next EC membership was listed at the last part of the meeting. While most of the members and observers will renew their status, Yun Liu of ANBUG will replace Ian Gentle, Eddy Giri Rahman Putra of INSS replace Evvy Kartini, Kazuhisa Kakurai of JSNS replace Yoshiaki Kiyonagi, Soo-Hyung Chou of KNBUA replace Sungkyun Park. Among observers, Masayusu Takeda of JRR3 will replace Mitsuhiro Shibayama.

Finally, Taku Sato urged the attendees and those responsible to submit newsletter articles by the deadline on November 30. Finally, Brendan thanked the host at TWNSS and all the participants. The 24th EC will be held in Indonesia sometime in May next year.

Jae-Ho Chung
(Secretary of AONSA)



The 18th Facility Directors Meeting held in Kenting, Taiwan

Introduction

The 18th Facility Directors Meeting (FDM) was held in Kenting, Taiwan on Sunday 17 November 2019 during the 3rd Asia-Oceania Conference on Neutron Scattering. The meeting took place at the venue of conference, the Howard Beach Resort Hotel.

Because many representatives of the Chinese facilities could not make it to Kenting, the conference organizers kindly set up the three-way video conferencing between Kenting, Beijing and Dong-Guan. From Beijing, Kai Sun of CARR participated the meeting along with observers, Dongfeng Chen and Yuntao Liu. From Dong-Guan, Fangwei Wang of CSNS participated the meeting. Although Fangwei Wang was officially the chair of the meeting, Sungil Park of HANARO lead the meeting on his behalf because of the difficulties of chairing the meeting over the video. Other participants were Toshiji Kanaya of J-PARC MLF, Masayasu Takeda of JRR-3 and Jamie Schulz of OPAL. Xin Ju and M. Rifai Muslih represented CMRR and G. A. Siwabessy on behalf of Gong Jian and Iwan Sumirat respectively. From the facilities, Yukinobu Kawakita of J-PARC MLF/JAEA, Kenji Nakajima of J-PARC/JAEA, Mitsuhiro Shibayama of JRR-3/ISSP and Wanchuck Woo of HANARO participated as observers. The AONSA to its suite of instruments. CARR operated for more than 100 days at 30 MW since July 2018 with 12 operational instruments. CMRR with its 8 operational instruments operated 4,100 hours in 2018 surpassing the previous record. G. A. Siwabessy operated stably at 15 MW for 150 days a year with 8 working instruments. Lastly, Dhruva continued its stable operation at 100 MW with 12 instruments.

board members and representatives of the communities also participated as observers. They were the AONSA president Brendan Kennedy, secretary Jae-Ho Chung, public relations officer Taku Sato, liaison for the AONSA office Hideki Seto and Apichate Maeewong of the Thailand community.

Facility Reports

After the usual opening of the meeting, participants presented the facility reports on JRR-3, CARR, CMRR, Dhruva and G. A. Siwabessy. CSNS, HANARO, J-PARC MLF and OPAL had the slot to present the facility reports in a plenary session during the conference. So only short comments were provided for the latter 4 facilities during the meeting.

It was apparent that the facilities in the region continued healthy growth. CSNS hit the beam power of 80 kW closing in on the ultimate target of 100 kW. J-PARC MLF had a successful 1 MW test operation for more than 10 hours and its target #9 operates stably at 540 kW with high availability now. JRR-3 received the license to operate and is expected to restart in February 2021. Opal added a new reflectometer, Spatz,

Unfortunately, HANARO remained shut down, and the Korean nuclear regulator was yet to give the approval to restart the reactor at the time of the meeting.

AONSA businesses

Three new AONSA Young Research Fellows were selected this year. The directors reaffirmed the conclusion of the last meeting to provide the names of



the host instruments along with the possible numbers of the Fellows they can accept in the next meeting. Regarding the AONSA Neutron School, the difficulties of attracting the students to the previous school in September in Korea were discussed. It seemed evident that coordination between neutrons schools in the region is required to avoid conflicting schedule. The directors discussed other ways to increase attendance, including facilities supporting students. More discussion was expected in the AONSA EC meeting the next day.

Discussion on challenges, opportunities, and cooperation between facilities

The directors had a follow-up discussion on forming the “League of Neutron Facilities”. European facilities had their own financial situation which motivated formation of LENS. Because FDM already functions as the avenue for cooperation between facilities, it did not seem necessary for Asian and Oceanian facilities to follow suite. To remind us of the reason why we are having FDM’s, the directors decided to have a half-day meeting and a half-day workshop on vision of the facility directors on facility development and regional cooperation in the next meeting.

Regarding the region-wide status report, Sungil Park asked directors for their help and expressed his intent to publish the finalized report in a journal.

The instrument scientists workshop held on the first day of AOCNS had a mixed result. Some sessions had a quite large number of instrument scientists attending, while others had only a few. Also lack of interest from the technical staff members was evident. The directors suggested embedding the instrument scientists workshop in the conference so that

participation can increase and organizational responsibility becomes clear.

The directors discussed briefly about diversity in their facilities. Besides having many women members, OPAL already has a very diverse staff coming from many parts of the world. There will be more discussion on this in the upcoming FDM’s.

The next FDM will be held in Indonesia in the first half of 2020. Fangwei Wang will chair the meeting, and either Jamie Schulz or Kenji Namajima will act as the secretary to support Fangwei Wang.

The directors thank Conference Chair Hsiung Chou and his students for their tireless effort to make the FDM successful by introducing video conferencing technology and providing great service to the participants.

Sungil Park
(KAERI)



Group photo of the 18th FDM. Video conferencing was introduced for the first time to the meeting, and the group photo included participants from Beijing and Dong-Guan on screen.



AONSA Prize 2019 Ceremony and Lecture

As previously announced Prof. Mahn Won Kim (Korea Advanced Institute of Science and Technology) was awarded the AONSA Prize 2019 for his seminal contributions in building Asia-Oceania Neutron Scattering Association and the establishing of the neutron scattering community and facility in Korea, for his successful application of second harmonic generation (SHG) to investigate the air/liquid interface, and for his devoted mentoring of young scientists in the community of neutron science.

The Ceremony of the AONSA Prize 2019 was held on November 30th just before the closing of the Asia Oceania Conference on Neutron Scattering (AOCNS 2019) in Kenting Taiwan. The session was chaired by Jae-Ho Chung, the secretary of AONSA, on behalf of the Chair of the Selection Committee. As

its highlight, Prof. Brendan Kennedy, the President of AONSA awarded Prof. Mahn Won Kim Certificate of Prize, Medal and Monetary Prize (US\$5,000). Prof. Mahn Won Kim donated US\$2,000 back to the AONSA out of his prize money. He delivered the Prize Lecture on his career in neutron scattering science, which audience attentively enjoyed and congratulated. Finally, a few congratulatory messages were given by the past presidents of AONSA (Wen-Hsien Li and Yasuhiko Fujii) as well as by the current presidents of the European Neutron Scattering Association (ENSA, Christiane Alba-Simionesco) and the Neutron Scattering Society of America (NSSA, Despina Louca).

Dongfeng Chen
(Vice president of AONSA)

Announcement of AONSA Young Research Fellows 2020



Dr. Tingting SONG



Dr. Jungju RYU



Dr. Taisen ZUO

The AONSA Young Research Fellowship program, which was established in early 2014, is to support highly talented young scientists with leadership potential in the Asia-Oceania region, helping them to develop their career and expertise in neutron science and technology. All applications were received by the submission deadline (August 31, 2019) and intensively reviewed by the Selection Committee (SC) for the AONSA Young Research Fellows (YRFs) 2020.

The final selections were made by the SC in consultation with three hosting neutron Facilities and officially approved at the 23rd AONSA Executive Committee Meeting on November 18, 2019 in Kenting, Taiwan.

It is AONSA's great pleasure to announce that three highly talented young scientists have been selected as the winner of AONSA YRF 2020 who will visit major neutron Facilities in the Asia-Oceania region for collaborative research using neutrons in 2020. The AONSA YRFs' round-trip airfare will be supported by AONSA, and their local living expense during their Fellowship visits will be supported by their hosting Facilities.

Hosting Facility: CSNS

Dr. Tingting Song

PhD in School of Engineering, RMIT University (Australia) (2016)

Current Affiliation: RMIT University (Australia)

Title of Research Proposal:

In situ neutron diffraction studies of the strengthening of additively manufactured high-performance Ti-alloys

Hosting Facility: ANSTO

Dr. Jungju Ryu

PhD in Chemistry, Hanyang University (Korea) (2016)

Current Affiliation: Korea Atomic Energy Research Institute

Title of Research Proposal:

Network structures of poly(ethylene glycol) controlled by crosslinking types

Hosting Facility: J-PARC

Dr. Taisen Zou

PhD in Institute of High Energy Physics, University of China Academy of Sciences (China) (2017)

Current Affiliation: Institute of High Energy Physics

Title of Research Proposal:

Single Chain conformation of polyethylene glycol in inclusion complex in solution and bulk crystal by neutron scattering.

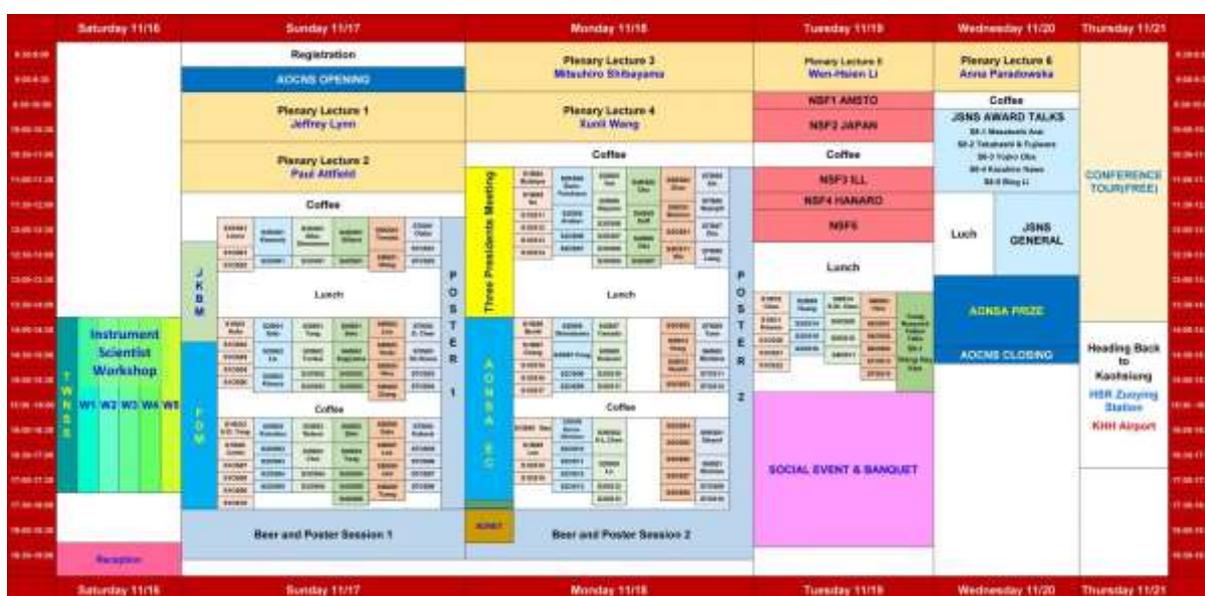
Dongfeng Chen

Vice President of AONSA

Asia-Oceania Conference on Neutron Scattering 2020

The 3rd Asia-Oceania Conference on Neutron Scattering (AOCNS2019) was held in Kenting National Park, which is situated at the southernmost part of Taiwan, during November 16~21, 2019. (www.aocns2019.org) Gathering of 313 scientists and students from 18 countries contributed around 300 presentations made the conference a perfect platform for exchanging and sharing latest development in scientific research. Comfortable guest rooms and meeting rooms provided a relaxing atmosphere away from busy and intense daily research work and a nursing ground for new idea and fruitful collaborations at the Conference site. The instrument scientist workshop consisted of five parallel

sessions (W1~W5) opened the exciting conference one day before the opening of main AOCNS. AOCNS had six plenary and five neutron science facility talks, six parallel sessions (S1~S7), one poster session and several committee meetings such as Japan-Korea Business Meeting (JKBM), Facility Director Meeting (FDM), AONSA Executive Committee Meeting (AONSA EC), Three Presidents Meeting, and Taiwan and Japan neutron society annual meetings. AONSA gave the most important award—AONSA prize—at the end of the Conference to Professor Kim to honor his vital contribution to Korea neutron science and to establish AONSA



Time	Saturday 11/16	Sunday 11/17	Monday 11/18	Tuesday 11/19	Wednesday 11/20	Thursday 11/21
8:00-09:00		Registration				
09:00-09:30		AOCNS OPENING	Plenary Lecture 3 Mitsuhiko Shikama	Plenary Lecture 5 Wen-Hsien Li	Plenary Lecture 6 Aron Paradowski	
09:30-10:00		Plenary Lecture 1 Jeffrey Lynn	Plenary Lecture 4 Xueli Wang	NSF1 AMSTO	Coffee	
10:00-10:30		Plenary Lecture 2 Pasi Aitfeld	Coffee	NSF2 JAPAN	JSNS AWARD TALKS SS-1 Masahito Arai SS-2 Takaharu & Fulmer SS-3 Hiroko Oda SS-4 Kazuhiko Nawa SS-5 Wang Li	
10:30-11:00		Coffee	Three Presidents Meeting	NSF3 ILL	Lunch	CONFERENCE TOUR(FREE)
11:00-11:30		J K B M	AONSA	NSF4 HARARD	JSNS GENERAL	
11:30-12:00		Lunch	Lunch	NSF5		
12:00-12:30		Lunch	Lunch	Lunch	AONSA PRIZE	
12:30-13:00		Lunch	Lunch	Lunch	AOCNS CLOSING	Heading Back to Keelung HSR Railway Station
13:00-13:30		Lunch	Lunch	Lunch		KHH Airport
13:30-14:00		Lunch	Lunch	Lunch		
14:00-14:30	Instrument Scientist Workshop					
14:30-15:00	W1 W2 W3 W4 W5					
15:00-15:30						
15:30-16:00						
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Photo-1: The plenary talks right after Conference opening on Nov. 16



Photo-2: The group photo on Nov. 16. Three presidents of AONSA, NSS and ENSA, and the five former presidents of AONSA and the 2019 AONSA prize winner and many of societies' presidents and delegates are happily gathering to celebrate the successful of the 3rd AOCNS.

By taking the advantage of high speed internet, five web meetings were held during the conference where we connected those who were not available to attend the on-site meeting. This was the first time to have web meeting in the conference with a great effect for broadened participants and opened up opportunities for

every person who was interested in contributing their insightful opinions to the conference no matter where they were. Similar group discussions by using the internet cyberspace will certainly become one of important future trend.



Photo-3: The group photo of EC meeting at the Kenting Conference site and at the Beijing and Dongguan sites



Photo-4: The web-conference connecting people from different sites in real time could be the future trend for gathering more delegates from various sites to exchange idea and joint discussions.

Three presidents of AONSA, NSS and ENSA discussed about the administration structures of each regional association, how they conducted cross-country collaborations and promotion of younger generation to involve in neutron application, and types of future challenges that needs everyone's effort to overcome. Even three associations have partial of similarities in

administration structure and goal, some distinct principle on the association operation and the goals are quite different. This strengthens the need of collaborations to integrate the strong part of each association. However, it is also raise a question on how and if it necessary to promote an international neutron association.



Photo-5: Three presidents of AONSA, NSS and ENSA meet at conference.

Enthusiastic discussion during poster session requires unlimited boosters such as good beer and wine. One of success of this conference is providing sufficient but

not overload of boosters for attendees, which was obvious from the long queue and unstoppable discussion before every posters.



Photo-6: Great booster excites great interesting and discussion during poster sessions.



AONSA prize of 2019 went to professor Mahn Won Kim to honor his contribution to the neutron application on material in Korea and service as the first president of the Neutron Beam Users Association (KNBUA). During the same period Professor Kim was one of major leaders in setting up the Asia-Oceania neutron scattering community and establishing AONSA as the first president to broaden neutron application. President

Brendan Kennedy on behalf of AONSA awarded Professor Kim the prize certificate, medal and US 5000 prize. We also thank Professor Kim for his generous donation of US2000 to AONSA. Former AONSA presidents Yashuhiko Fujii, Wen-Hsien Li, Cung-Min Choi and the secretary of the 1st AONSA Board member Masatoshi Arai all joined this important event and gave their memorable appreciation to Professor Kim.



Photo-7: President Brendan Kennedy awarded AONSA prize to and accepted from Professor Kim.

Banquet of AONSA was not only food and drink but a reunion for contributors of AONSA and a welcome party for our distinguished guests from Europe and America. The roaring drumming of the native peoples of Taiwan declared the beginning of the ceremony

moment and the dancing stirred up the atmosphere to highest point. Celebration and a toast remarked the invisible bonding between neutron guys. Of course, various beers and wine worked as catalysts to boost the reaction among us.



Photo-8: The precious moments of the banquet of 3rd AOCNS 2019.

Conference tour was the best ending for this conference. Everyone enjoyed visiting the Eluanbi Lighthouse at the most southern tip of Taiwan that guides the safety of ship cursing around strong ocean current in the old time. Now a day, its light beam keep shining in darkness as a connecting beam that bond the ocean traveler to the

mother land. The magnificent view of the cliff, the Long Pan Park formed by the rising limestone terrace of the Pacific Ocean provides an overlook to the green grass cascading into the deep blue ocean.

Hsiung Chou
(National Sun Yat-sen University)



Photo-9: The Conference Tour at the last day of AOCNS2019.

Report on the 11th AONSA Neutron School (Aug. 19 ~ 23, 2019)

The 11th AONSA Neutron School was held at High-flux Advanced Neutron Application Reactor (HANARO) in Daejeon, Republic of Korea from August 19 to 23. The school was organized by Korea Atomic Energy Research Institute (KAERI) and Korea Neutron Beam User Association (KNBUA) with the support of the Asia-Oceania Neutron Scattering Association (AONSA).

The school was open to both local and international students and postdocs, who are mostly newcomers to the field of neutron science. It was attended by total 17 participants from 7 countries: Taiwan (3), Thailand (1), Malaysia (1), Indonesia (1), China (1), Pakistan (1) and Korea (9). The school hosted total 17 lecturers from Australia, Japan and Korea, who delivered enthusiastic and professional lectures.

Beginning with the opening remark by president of KNBUA, the school provided intensive lectures about neutron scattering research frontiers across physics, chemistry, biology, and material science. The program was supposed to include hand-on experiment

and practice by using HANARO instruments, however, it changed to demonstration due to the delay of reactor operation. Instead, the school provided comprehensive theoretical knowledge in modern neutron scattering techniques and applications such as powder diffraction technique, single-crystal diffraction, inelastic scattering, reflectometry, neutron imaging and small angle neutron scattering, which are lectured by experts of HANARO neutron scattering instrumentation. On the last day of the school, all participants gave a short presentation regarding on their own research topics in relation with neutron scattering techniques they've learned from the school.

Beside the formal program, the school also provided a couple of opportunities for social networking between international participants and lectures.

We appreciate very much lecturers for their dedicated efforts and contributions. We also thank organizations for their kind support for this successful event.

Sungdae Ji

(Korea Atomic Energy Research Institute)



The group photo of 11th AONSA neutron school

Reports from neutron associations

Report from the Australian Neutron Beam User Group (ANBUG)



ANBUG is run for the benefit of members and all profits from our User conferences are used to offer student prizes and travel bursaries. We promote neutron scattering to the community, especially to students and early career researchers.



In 2019, we have focused on the organization of the Joint User Meeting which includes research presentations from both neutron, synchrotron and accelerator users. The AUM 2020 will be held at Macquarie University, Sydney, Australia from December 2-3rd. To date we have approximately 140 registrations and have planned extensive outreach to local 11 and 12 years through ANSTO's Outreach Program which includes a "Meet the Scientist". Student travel has been supported through AINSE.

During the AUM, we will be presenting our awards. This year we are giving awards in the following categories:

ANBUG Career Award – for sustained contribution throughout the recipient's career to a scientific subfield, or subfields, using neutron scattering techniques.

ANBUG Neutron Award – for outstanding research in neutron science and leadership promoting the Australian neutron scattering community (>10 years post PhD).

ANBUG Young Scientist Award – for outstanding research utilising neutron scattering by scientists within 10 years of PhD conferral when accounting for significant career breaks.

ANBUG Outstanding PhD Prize – for a PhD thesis on research using neutron scattering techniques. The PhD thesis must have been submitted after 1st January 2018 to an Australian or New Zealand University.

In other neutron news, the Australian Institute of Physics (AIP) selected, Dr Helen Maynard-Casely, an instrument scientist at ACNS, as the 2019 'Women in Physics Lecturer.'

Helen presented a national series of public and schools lecturers on neutron scattering in every state and ACT.



Dr. Helen Maynard-Casely

Helen Brand (Australian Synchrotron) held a joint OPAL/synchrotron powder diffraction workshop on "Powder diffraction at the Australian Open and Opal: A workshop for beginners" in August. Attendees included neutron diffraction experts such as Vanessa Peterson and Brendan Kennedy.



HZB-ANSTO Neutron School 2019

The first joint Helmholtz Zentrum Berlin-ANSTO neutron school took place from 23 to 28 June 2019 at ANSTO. HZB experts Prof Bella Lake and Prof Susan

Schorr gave several lectures. The interest in the neutron school was high, with 24 participants selected from 60 applications.



HZB-ANSTO Neutron School 2019

Other ANBUG activities have included the implementation of a new membership/ mailing system with a view to initiate the transfer by the end of the year to the new system.

ANBUG is also has been developing a new equity policy which will be in place for the AUM 2019 meeting.

ANBUG has made two nominations for AONSA young research fellowships in 2020: TingTing Song and Rezwanul Haque.

Tracy Rushmer
(ANBUG)

Indonesian Neutron Scattering Society

Workshop and Conference

Workshop on Neutron Scattering 2019 (WoNS 2019) was held on 2-4 September 2019 at PSTBM, National Nuclear Energy Agency (BATAN), at Puspiptek, Serpong. This activity was attended by 32 participants, coming from universities in Indonesia, research institutions, private companies, and ministries. The activity was filled with theory and practice. Theory was carried out in class with several subjects, namely neutron and its application, crystal structure and materials phase analysis, residual stress theory, application of tomography technique on industrial materials, medicine, agriculture and archeology, crystallographic texture, small angle neutron scattering, neutron activation analysis, and safety orientation.

For practice, visit to the Neutron Scattering Laboratory has been performed, practiced using a neutron diffractometer, neutron spectrometer, neutron radiography, and gamma spectrometry, and data analysis. The workshop ended with a presentation session by participants describing each group's assignment. Speakers of the workshop were Prof. Evvy Kartini (BATAN), Dr. Agung Nugroho (ITB), Prof. Triyono (UNS), Dr. Warsito (Edwar Technology), Drs. Tri Hardi Priyanto, MT (BATAN), Arum Patriati, M.Sc.(BATAN) and Drs. Sutisna, DEA (BATAN).



Fig. 1. The WoNS2019's activities.

At the end of the event participants were asked to give an impression and message. There were four participants who gave messages and impressions during the workshop. In general the participants strongly supported this kind of workshop, and hoped that the workshop could be held once a year with a longer period of time.

Meanwhile, the International Conference On

Advanced Materials Technology (ICAMT) – International Conference Of Multidisciplinary Research (ICMR) 2019 was held in Aston, Sentul, Bogor 8-9 October 2019, and jointly organized by Indonesian Neutron Scattering Society (INSS), Materials Research Society Indonesia (MRS-INA) and University of Dr. Mustopo Beragama, with the aim to promote Indonesian activities on the advanced materials and technology to the International forum. At the same time, the International of multidisciplinary research was held, in order to synergy both materials science and social science facing the society 5.0. The conference was opened by the Chairman, Prof. Dr. Rudi Harjanto, from Mustopo, and Prof. Dr. Evvy Kartini as the President of INSS and MRS-INA. The application of nuclear science and technology was delivered by Prof. Dr. Anhar Riza Antariksawan, the head BATAN.



Fig. 2. The opening ceremony of ICAMT-ICMR 2019.



Fig. 3. Participants of ICAMT-ICMR 2019

There are more than 250 participants from various institutions, university, industry and foreign countries. An International Workshop on Battery Technology was organized during the event with more industry participants and students to know the progress of lithium ion battery. The keynote speakers came from

various countries, Japan, Australia, UK, China, Singapore, Korea, Malaysia, etc. The representative from AONSA, Prof. Dr. Taku Sato, delivered the keynote lecture at the ICAMT.



Fig. 4. Keynote lectures of ICAMT-ICMR 2019.

As the tradition of our conference, all the participants were taken for cultural tour at the Presidential Palace Museum and Royal Botanical Garden, Bogor, then enjoying dinner at the Garden Resto, with beautiful scenery.



Fig. 5. Lecture at the International Battery Workshop, Aston Sentul, Bogor 8-9 October 2019.

There were enthusiasm of participants coming from various industries to join the International workshop on battery technology. The speakers, not only came from the expert from university, institution, but also from the industry. Dr. I made Tangkas as the chair of Automotive Association Indonesia, and Mrs. Ratih from the Indonesia Mining and Materials Industry, Inalum, shared their experiences with the participants. The application of neutron scattering for battery research was also delivered by Prof. Evvy Kartini, from BATAN. The Conference and workshop were successful in promoting the nuclear science in Indonesia.

Development of Publication Media

The INSS also supports the publication of Atom Indonesia, an international journal related to nuclear and science technology published by BATAN. A very good news, that since 2017, the Journal has been

indexed by Scopus and becomes one of the best journal in Indonesia, related to nuclear science and technology. An International Atom Indonesia Best Paper Award (I-AIBPA) was annually organized (<http://aij.batan.go.id>). The winners of best papers was awarded the prize US\$ 700, and certificate.



Fig. 6. The journal of ATOM INDONESIA, supported by INSS

**Evyv Kartini, Eddy Giri Rahman Putra,
Iwan Sumirat and Darminto**
(Indonesia Neutron Scattering Society – INSS)

Report from JSNS

Status of JSNS

As of Oct. 1, 2019 the number of the JSNS members is 564 including 32 students. In addition there are 28 senior members. The number of the supporting members is 33.

Currently the election of the council members, whose term is ending in 2019, is under way.

Present Council Members:

Term: 2018-2019 Japanese Fiscal Year (JFY)

Masahiro Hino (Kyoto Univ.)
 Takashi Kamiyama (Hokkaido Univ.)
 Takashi Kamiyama (KEK)
 Yukinobu Kawakita (J-PARC)
 Mitsuhiro Shibayama (Univ. Tokyo)
 Junichi Suzuki (CROSS)
 Naoya Torikai (Mie Univ.)
 Osamu Yamamuro (Univ. Tokyo)

Term: 2019-2020 JFY

Hitoshi Endo (KEK)
 Masaaki Fujita (Tohoku Univ.)
 Hazuki Furukawa (Ochanomizu Univ.)
 Michiro Furusaka (AIST)
 Hiromichi Kishimoto (Sumitomo Rubber Ind.)
 Kenji Ohyama (Ibaraki Univ.)
 Naoya Torikai (Mie Univ.)
 Hirohiko Shimizu (Nagoya Univ.)
 Masayasu Takeda (JAEA)

JSNS Activities

JSNS Awards

The following 2019 JSNS Prizes have been awarded.

The JSNS Outstanding Achievement Prize

Masatoshi Arai
 European Spallation Source ERIC
 (ESS)

'Pioneering research and development of the pulse neutron science and technology'



The JSNS Technology Prize

Hiroyuki Takahashi ¹⁾
 and Takeshi Fujiwara ²⁾
¹⁾Institute of Engineering
 Innovation, School of
 Engineering, The University of
 Tokyo
²⁾National Institute of Advanced
 Industrial Science and
 Technology (AIST)



'Development of the neutron flat-panel detector'



The JSNS Young Researcher Prizes

Yojiro Oba
 Materials Sciences Research Center,
 Japan Atomic Energy Agency
 (JAEA)



'Microstructural characterization in steel using small-angle neutron scattering'

Kazuhiro Nawa
 Institute of Multidisciplinary
 Research for Advanced Materials
 (IMRAM), Tohoku University



'Investigations on low-dimensional and frustrated magnets'

Bing Li
 Shenyang National Laboratory for
 Materials Science, Institute of Metal
 Research, Chinese Academy of
 Sciences



'Research on dynamics of functional materials using quasi-elastic and inelastic neutron scattering'

The 4th Neutron and Muon School has been held at J-PARC from Oct. 28 to Nov. 2, 2019.

The school was held jointly with MIRAI PhD School 2019. The MIRAI PhD School focuses on Materials Science at large-scale facilities like synchrotrons and spallation sources. MIRAI is a three-year project connecting Swedish and

Japanese universities through research, education and innovations addressing scientific issues within Ageing, Materials Science and Sustainability, relevant to both countries.

There were 41 school participants with 12 nationalities. The details of the school with the program and photographs are shown below.



The 4th Neutron and Muon School & MIRAI PhD School 2019

Date: 28 October – 2 November 2019
Venue: J-PARC MLF
Eligibility: Graduate Students, Post-doctoral fellows and early career researchers from both universities and companies

Support Organizations:
 JSNS, JMMS, J-PARC, JAEA, IMSS, KEK, ISSP, Ibaraki U., Industrial User Society for Neutron Application, CROSS, Ibaraki Prefecture, MSR, International Society for μ SR Spectroscopy, MIRAI, SwedNess, STINT, Hiroshima U., HiSOR

Participants: 41 (Nationality)
 10 (Japan), 9 (China), 8 (India), 4 (Korea), 2 (Sweden), 1 (Thailand), 1 (Russia), 1 (Spain), 1 (Hungary) 1 (US), 1 (Malaysia), 1 (Nepal)



Program

The 4th Neutron and Muon School & youngMOEAS-2019 28th October - 2nd November 2019, J-PARC, Japan						
	28 Oct. Sun	29 Oct. Mon	30 Oct. Tue	31 Oct. Wed	1 Nov. Thu	2 Nov. Fri
8:00	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast	Breakfast
9:00	Registration <small>Open until 10:00 AM</small>	Neutron Diffraction	Inelastic & Quasi-elastic Neutron Scattering	Science Seminar	Hands-on Data Analysis	Preparation Hands-on Presentation
10:00	Introduction to Neutron Science					Coffee
11:00	Coffee	Neutron Reflectometry	Small Angle Neutron Scattering	Lunch	Lunch	Lunch
12:00	Introduction to JRR-3 & J-PARC					
13:00	Lunch	Lunch	Lunch	Lunch	Lunch	Lunch
14:00	Introduction to Muon Science	J-PARC tour	Neutron Imaging	Hands-on Data Analysis	Hands-on Data Analysis	Hands-on Presentation
15:00	Coffee	Coffee	Coffee			Closing
16:00	Neutron & Muon Production	Muonic X-ray	BlazeVet Pitch Presentation & Poster Session	Hands-on Data Analysis	Hands-on Data Analysis	
17:00	Safety Education	Coffee				
18:00	Welcome Reception	Muon Spin Rotation/Relaxation	Dinner	Dinner	Dinner	Dinner

Lecturers

- Introduction to JRR-3 and J-PARC :** T. Kanaya (J-PARC)
- Introduction to Neutron Science :** A. Matic (Chalmers U Tech)
- Introduction to Muon Science:** K. Shimomura (J-PARC)
- Neutron Production:** Y. Kiyanagi (Nagoya U)
- Muon Production:** N. Kawamura (J-PARC)
- Neutron Diffraction:** N. Matsubara (KTH)
- Neutron Reflectometry:** B. Hjorvarsson (Uppsala U)
- Muonic X-ray:** K. M. Kubo (ICU)
- Muon Spin Rotation/Relaxation:** T. Adachi (Sophia U)
- Inelastic & Quasi-elastic Neutron Scattering:** T. Masuda (ISSP)
- Small Angle Neutron Scattering:** E. Blackburn (Lund U)
- Neutron Imagne:** T. Kamivama (Hokkaido)



Lectures



Hands-on Data Analysis



Presentation

- Each group makes a 10-minute presentation on the last day.
- They present what they did at the hands-on experiments to both other participants and beamline staffs.
- The Best Presentation Prize is awarded by vote of all participants and staff.

The 19th Annual Meeting of the Japanese Society for Neutron Science has joined the AOCNS2019.

JSNS Award Lecture session (open for AOCNS participants) and the General Assembly (closed session for JSNS members) have been accommodated in the AOCNS program on Nov. 20, 2019. (<https://www.aocns2019.org/>)

We thank the local organizing committee, headed by Prof. Hsiung Chou, for their kind cooperation to accommodate these JSNS sessions into the conference program.

The 20th Annual Meeting of the Japanese Society for Neutron Science will be held in Sendai from Nov. 9 to 11, 2020.

Kazuhisa Kakurai
(JSNS)

Report from Neutron Scattering Society of India (NSSI)

National Seminar on Crystallography (NSC) is a prestigious scientific annual event and enthusiastically attended by the crystallography community in India. The seminar is organized annually by Indian Crystallographic Association (ICA). So far 46 such seminars were held at various places in India. This year, the 47th NSC was organized during June 19-22, 2019 at Bhabha Atomic Research Center, Mumbai by ICA and National Committee of Indian National Science Academy (INSA) for International Union of Crystallography (IUCr) in association with the Neutron Scattering Society of India (NSSI). The Seminar gave an emphasis on the role of neutron scattering in crystallography.

Nearly 300 researchers across India from various disciplines ranging from physics, chemistry, biology and medicine had participated the seminar and discussed the science involving structural details of materials.

DAE has two major National Facilities: (1) National Facility for Neutron Beam Research (NFBNR) at Dhruva reactor, BARC, Mumbai, and (2) INDUS-1, & INDUS-2 synchrotron facilities at RRCAT, Indore. These facilities have exclusive beam lines devoted to crystallographic research. NSC47 provided opportunities to young researchers to interact with experienced scientists working in the above major national facilities for crystallographic studies. NSC47 also provided a larger platform for the scientists working in all fields of crystallography and crystal growth to share their observations, scientific experience and achievements. The scientific deliberations included plenary sessions, invited talks, seminars and contributory papers. The contributory papers.

were presented as posters and oral presentations.



Participants of the 47th NSC, Mumbai



Inaugural Session of the 47th NSC, Mumbai (From left: Dr. S. M. Yusuf, Dr. S. C. Mande, Dr. R. Chidambaram, and Prof. M.R.N. Murthy)

S. M. Yusuf, President,
(Neutron Scattering Society of India)

News from Taiwan Neutron Science Society (TWNSS)

TWNSS annual Meeting (November 16, 2019)

The TWNSS 2019 annual meeting was held on November 16, 2019 in the Howard Resort, Kenting. Prof. Ko-Wei Lin, TWNSS President, gave a presentation about the status and overview of the society's activities during this year, such as (1) having held two committee meetings (February in Kenting and October in Taichung) for the preparation of AOCNS 2019, (2) TWNSS newsletter (vol. 6, no. 2) was released in August, 2019 (Editor Prof. E-Wen Huang), (3) members' participation into NSRRC's annual user meeting in September, and (4) congratulating Dr. Chih-Hung Lee, the recipient of 2019 AONSA Young research Fellow. Prof. Hua-Shu Hsu, TWNSS Secretary, presented the financial report of the society. After the opening session, Prof. Mitsuhiro Shibayama from the University of Tokyo gave the Plenary speech. The TWNSS annual meeting group photo is shown in Fig. 1.



Fig. 1. 2019 TWNSS annual meeting group photo.

AOCNS 2019 (November 16-21, 2019)

The 3rd Asia-Oceania Conference on Neutron Scattering (AOCNS) 2019 was held in the Howard Resort, Kenting (on southern Taiwan) on November 16-21. The program consisted of 7 different topics (S1: Condensed Materials Physics, S2: Materials Science and Chemistry, S3: Soft Matter Systems, S4: Food and Biological Science, S5: Engineering and Industry, S6: Fundamental Physics, S7: Sources, Methods and Techniques). Presentations were in the form of oral (plenary speakers (Jeffrey Lynn, Paul Attfield, Wen-Hsien Li, Xunli Wang, Mitsuhiro Shibayama, Anna Paradowska), keynote and invited speakers), and poster sessions, in addition to meetings such as the Instrument Scientist workshop, AONSA EC, Three President (NSSA, ENSA, and AONSA), Neutron Science Facility, JSNS award, AONSA prize, AOCNS closing, and conference tour.

AONSA President Brendan Kennedy gave the opening speech. The conference chair, Hsiung Chou, presented the details of the program, exhibition, and sponsors, etc. NSSA President Despina Louca and ENSA President Christiane Alba-Simionesco as well as the local host, TWNSS President Ko-Wei Lin, also gave a few words. More than 250 people participated. The AOCNS conference photos are shown in Fig. 2.



Fig. 2. AOCNS 2019 conference photos.
Ko-Wei Lin (TWNSS)

Report from Thailand Community

Since 1962, Thailand has been utilizing a nuclear research reactor for a wide variety of applications including radioisotope production, research and development (R&D) and educational training. The Thai Research Reactor-1/Modification 1 (TRR-1/M1) is an open pool type TRIGA-Mark III using light water as a coolant, moderator, reflector and shield with concrete biological shield and four neutron beam tubes. Two of the beam tubes were used for neutron diffraction (ND) and neutron imaging (NI).

Neutron tomographic imaging capability was the most progressed in recent years. Thailand Institute of Nuclear Technology, TINT, is now capable of neutron tomography. The upgrade of the camera and lens system is planned for 2021.

Thailand's neutron diffractometer has been decommissioned. The neutron diffractometer at TRR-1/M1 was modified from the obsolete neutron diffractometer which had been used during 1968-1975. Next, the upgraded diffractometer had been continuously operated during 1976-2005 which had medium resolution and was appropriate for studying samples with small unit cell dimensions and training university students in the field of neutron scattering. The new generation of neutron diffractometer will be replaced in a few years from now.



INST2019 during February 4-6, 2019



Newton Neutron Applications (NNA) Workshop

Thailand has expected that neutron scattering community expanded in near future. Neutron techniques and applications workshop was added as one of special session in the international nuclear science and technology conference (INST) which will be held in every 2 years. Transfer knowledge and experiences to university was always done for creating awareness and seeking for future collaboration.

TINT is highly appreciative of the opportunity to be part of AONSA community.

T. Rattanawongwiboon
(Thailand Community)

Reports from neutron facilities

Report from J-PARC

The user program ended on July 3, 2019 using the neutron target (#9) with an availability of 94% to the scheduled beam time. Just after the user program 1MW test operation was performed for 10.5 hour and was succeeded with the availability of 98 %, which was a great step for 1MW steady operation in J-PARC MLF. During the summer maintenance shutdown the used target (#9) was being replaced to the new target (#10) which had constrain-free type structure. The neutron production operation will start at 500 kW after the maintenance period and the power will be increased step by step considering the stable operation. J-PARC symposium was held to celebrate the 10th anniversary of the J-PARC operation during September

23 and 26, and more than 600 people participated in the symposium (Figure 1). The 4th Neutron and Muon School was held together with MIRAI PhD School (Young MIRAI-2019). MIRAI is a collaboration program between Swedish and Japanese universities based on large scale facilities activities. The number of participants was 41, including Japan (10), China (9), India (8), Korea (4), Sweden (2), Thailand (1), Russia (1), Spain (1), Hungary (1), US (1), Malaysia (1) and Nepal (1). They enjoyed lectures and hands-on experiments (Figure 2).

Toshiji Kanaya
(J-PARC)



Figure 1. Group photo at J-PARC symposium during September 23 and 26, 2019.



Figure 2. Group photo of the 4th Neutron and Muon School with MIRAI PhD School held during October 28 and November 2, 2019.

Report from JRR-3

JAEA (Department of Research Reactor and Tandem Accelerator): JRR-3 has been suspended its operation for more than 8 years owing to an aftermath of the severe accident of Fukushima Dai-ichi Nuclear Power Stations in 2011. Safety review of JRR-3 under the New Regulatory Requirements was completed on 7th November 2018. However, the roof of the reactor building has to be reinforced due to an increase of estimated maximum seismic motion following new knowledge of active faults near JRR-3 in the reviewing process. On this occasion, we decided to make reinforcement of the peripheral structures like a stack, a cooling tower, the experimental hall and so on to assure the higher seismic performance. We have already started the reinforcing work. Neutron beam will come back in early 2021 through several additional reviews and inspections for the reactor safety. The replacement of the cold neutron guides in the in-pile section very near the core with the high-performance supermirrors of $3Q_c$ has been completed in this October. A gain factor at the sample position is expected to reach almost five in the most effective case although the gain factor strongly depends on the optics of each instrument.



Figure 1 Photographs of the reinforcement work of JRR-3

ISSP: Neutron Science Laboratory (NSL) of ISSP has been running Overseas-Experiment Program since 2012. Travel expenses for two scientists per proposal were supported under the program. 47 persons were sent abroad in JFY2018, and 17 persons in JFY 2019 (as of Oct. 02, 2019), namely, OPAL, NIST, ILL, ORNL, etc. Table 1 shows the statistics of the program. 100 papers have been published in refereed journals since JFY 2011. See,

<http://www.issp.u-tokyo.ac.jp/labs/neutron/download/OverseasPubList.htm>

NSL continues call-for-proposals every year to keep neutron users in Japan. For JFY 2019, 83 general user proposals and 17 Instrument and Research Team (IRT) proposals were approved. Some proposals will be supported by the Overseas-Experiment Program.

Table 1. Numbers of scientists sent to overseas facilities since 2011 under Overseas-Experiment program of NSL-ISSP.

Facility	Number of users									
	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	
IFR ILL France	3	9	0	4	3	1	0	3	0	
OPAL ANSTO Australia	7	7	4	18	22	35	25	19	12	
HANARO KAERI Korea	2	7	7	0	0	0	0	0	0	
FRM-II MZL (Munich) Germany		4	1	0	8	1	7	2	0	
SIS: Rutherford Appleton Laboratory UK		4	2	4	4	0	4	3	1	
SPHQ PSI Switzerland		1	4	5	6	1	3	4	0	
NBSR NIST USA			3	13	5	2	11	6	3	
BER II HZB (Berlin) Germany			2	0	7	3	2	2	1	
IFR ORNL USA	13		1	1	1	6	4	7	0	
SNS ORNL USA			4	2	1	5	6	1	0	
ORPHEE LLB France			1	1	1	1	2	0	0	
Total	25	32	29	48	58	55	64	47	(17)	

In order to re-activate User Program effectively, NSL has started to examine university-owned instruments for upgrading/abolishment.

Mitsuhiro Shibayama (ISSP, U. Tokyo),
Yoji Murayama (JAEA),
 and **Masayasu Takeda** (JAEA)

Report from ANSTO

Australia's Open Pool Australian Light-water (OPAL) reactor is a state-of-the-art 20 Megawatt reactor that uses low enriched uranium (LEU) fuel to achieve a range of nuclear medicine, research, scientific, industrial and production goals.

The Australian Centre for Neutron Scattering operates the suite of neutron beam instruments at the OPAL reactor and leads Australia in the use of neutron scattering and X-ray techniques to solve complex research and industrial problems in many important fields. There are currently 15 operating neutron beam instruments available for users.

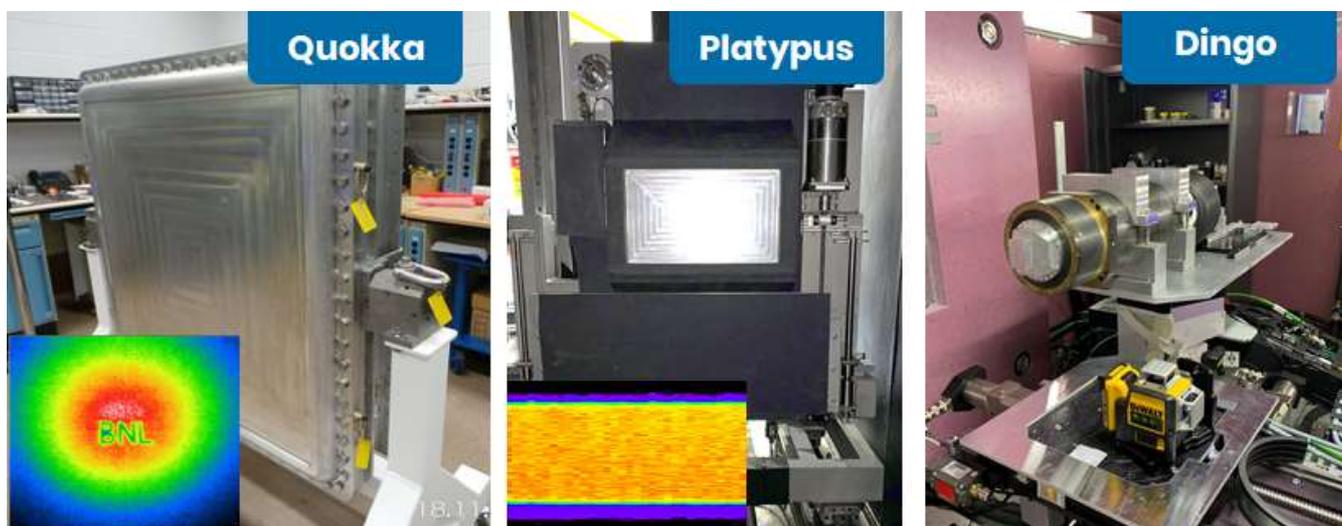
Open competitive access to the neutron beam instruments is available through the Australian Centre for Neutron Scattering Customer Portal (<http://neutron.ansto.gov.au>). Calls occur biannually and close in 15th September and 15th March.

In 2019 we completed the installation and commissioning of the Spatz neutron reflectometer which has been installed the CG2B neutron guide. Spatz

was transferred to ANSTO under a donation agreement with the Helmholtz-Zentrum Berlin in Germany. Spatz is now available in the user program.

A number of major projects were also completed in 2019 including:

- High-performance SANS detector for Quokka which has been operated with a global count rate that is 90 times higher than the previous detector.
- High-resolution imaging capability for Dingo the neutron radiography/imaging/tomography instrument
- New detector for Platypus neutron reflectometer
- New sample environment equipment including two fast cryostats, 7T magnet and a dilution fridge



New detectors for Quokka & Platypus and Dingo high resolution imaging capability.

In mid-2020 the neutron guide hall instruments will have a long shutdown to enable the replacement of the TG123 primary shutter and the installation of an additional split neutron guide in the TG123 neutron beam assembly.

A total of 277 proposals for cold- and thermal-neutron

beam experiments were received for the 2020-1 proposal round with 110 proposals approved by the Australian Centre for Neutron Scattering & National Deuterium Facility Program Advisory Committee.

Jamie Schulz
(ANSTO)



Australian Centre for Neutron Scattering 2019 group photo.

Report from KAERI

IAEA designates HANARO as International Centre based on Research Reactor (ICERR)

Source Operation

Not much has changed at HANARO, the 30 MW thermal-power research reactor located in Daejeon, Korea, since the last newsletter was published. The reactor remains dormant as it waits for the approval to restart from the Nuclear Safety and Security Commission. (As of writing, the reactor restarted and tripped, but I will describe the still developing situation in the next issue after the fog of confusion clears out.)

Instrument Status

Since the last report, one more instrument was added to the suite of operational instruments: the Disk-Chopper Time-of-Flight spectrometer (DC-ToF). The High Resolution Power Diffractometer (HRPD) and the Residual Stress Instruments (RSI) still have troubles with their detection systems. Two bio-crystallographic instruments, Bio-C and Bio-D remain waiting for the regulatory approval. The most damaged neutron guides in the curved section of the guide system are in the process of replacement.

Events

HANARO hosted the AONSA Neutron School and the 4th IAEA Training Workshop on Advanced Use of Neutron Imaging in Research and Applications (AUNIRA) in August and September 2019 respectively. The Neutron School is co-organized with KNBUA and took place from Monday 19 August to Friday 23 August. AUNIRA was held from Monday 23 September to Friday 27. Both did not have hands-on neutron beam experiments because of the lack of reactor operations during the school and the workshop. There will be separate reports on these activities.

ICERR

Just before AUNIRA, Tuesday 17 September, the International Atomic Energy Agency (IAEA) designated HANARO and the training facilities at KAERI as the 5th International Centre based on Research Reactors in the world. The Centre is a scheme to “help IAEA Member States gain timely

access to relevant nuclear infrastructure based on research reactors (RRs) to achieve their capacity building and R&D objectives.” Although the reactor is not operational at the moment, KAERI intends to establish HANARO as a hub for neutron scattering and other research reactor related activities through bilateral agreements in the ICERR scheme, hoping to achieve similar status to the multinational user service facilities in Europe.

Conclusion

The reactor operation has a large uncertainty under the current regulatory environment that paralyzes any activities. The designation of ICERR shows, however, the unwavering commitment from KAERI not only to revive the reactor but to make it an international hub for neutron science. Because a lot is happening at the moment with the restart of HANARO, there will be more to speak about the reactor and its neutron science facility in the next issue.

Sungil Park
(KAERI)
2019. 12. 07.



The acting Director General of IAEA, Cornel Feruta (center right) handed over the ICERR plaque to the President of KAERI, Won-Seok Park (center left). The Korean government's 1st Vice Minister of Science and ICT, Mun Miock (left) and Ambassador Shin Chae-hyun of the Embassy and Permanent Mission of the Republic of Korea in Austria (right) joined the ceremony.

Report from China Advanced Research Reactor

Since July 2018, CARR has run safely and reliably more than 100 days at 30MW. The operational schedule of CARR was shown in Fig 1. Up to now, there are 12 instruments been built and 6 facilities under construction. At the same time, a great deal of cooperation has been developed with the researchers at domestic and abroad. Many scientific researches and industrial component experiments have been carried out

by the neutron facilities in CARR. 28 papers were published by staff of neutron scattering lab at CARR since January 2018. And some results have been published in internal and international journals such as *Nano Energy*, *Applied Radiation and Isotopes*, and so on.

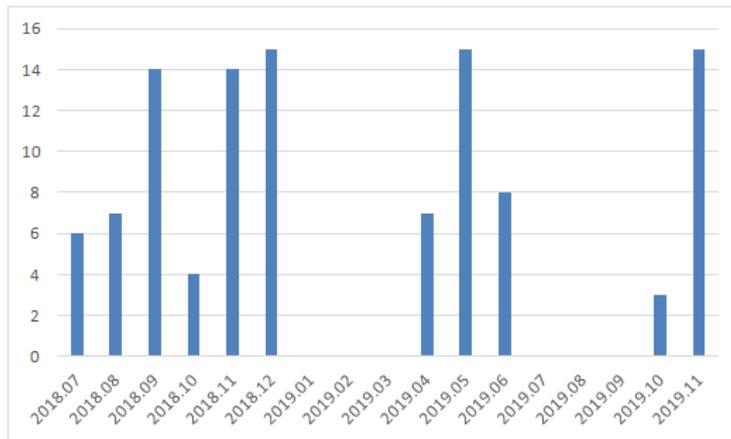


Fig.1 The operational schedule of CARR

In addition, improvements on neutron guide system has been on-going in the guide hall of CARR. The purpose is to upgrade 5-meter neutron guides of CNGA and modify the direction of CNGB to make more room for

Phase III facilities; Now guides have been dismantled in August 2019 as scheduled and all of the task will be completed in the first half of 2020 in Fig.2.

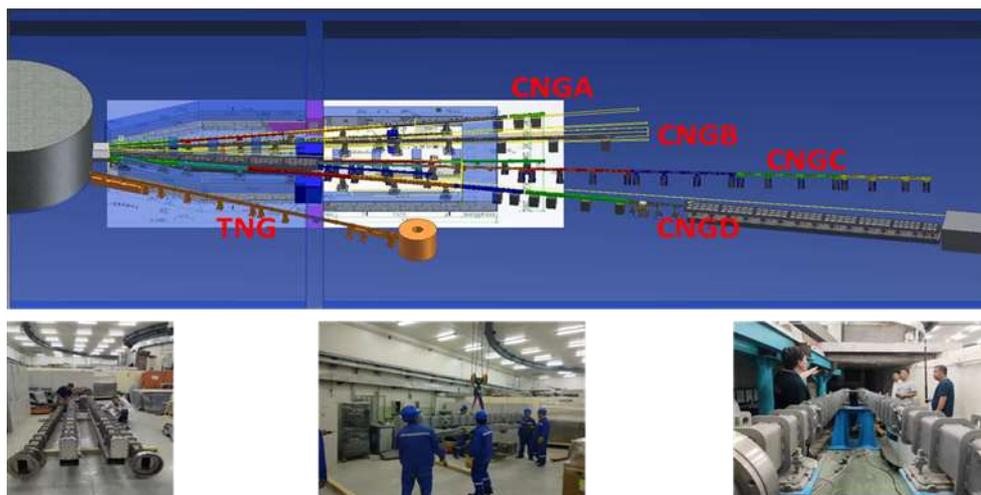


Fig.2 Improvements of neutron guide system at CARR

Besides that, CARR staff have help held and attended many import conferences and meetings in neutron scattering society including neutron summer school in Beijing, June 2019 (Fig.3), ECNS in Saint

Petersburg ,July2019 (Fig.4) and CNSS-The 7th National Conference on Neutron Scattering, Beijing, November 2019 (Fig.5).



Fig.3 Neutron Summer school,Beijing,June2019

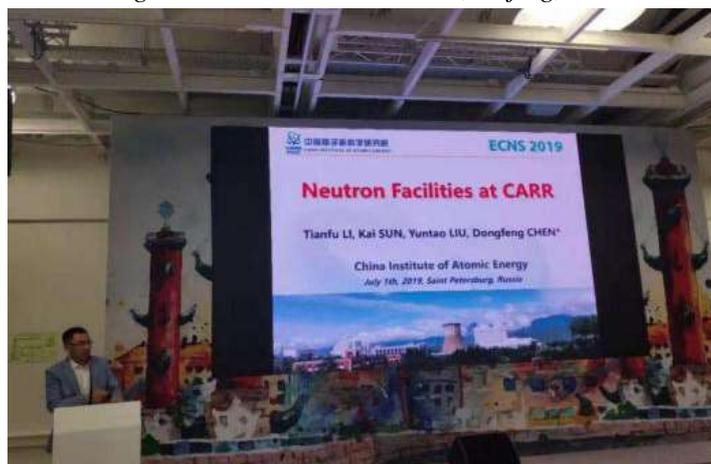


Fig.4 ECNS, Saint Petersburg,July2019



Fig.5 CNSS - The 7th National Conference on Neutron Scattering, Beijing, November 2019

Here are some examples of neutron scattering on scientific researches. Firstly, neutron powder diffraction have been used to study battery material, hydrogen storage, magnetic, ZrH alloy and so on. And Fig.6 shows the application

of neutron powder diffraction in battery materials. In this facility, over 5 high quality papers have been published in 2019.

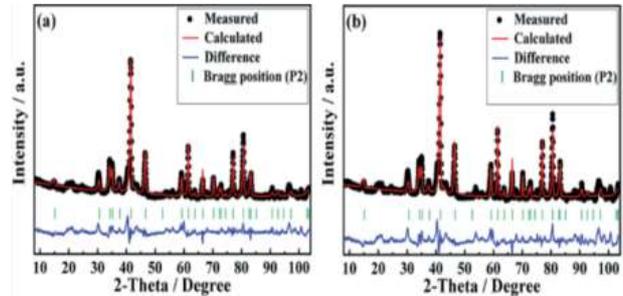
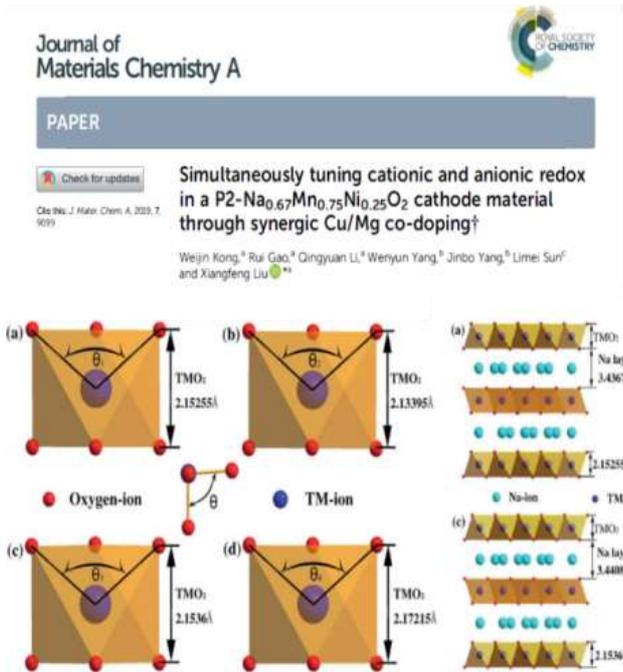


Fig.6 Application of neutron powder diffraction in battery materials

Secondly, neutron residual stress diffractometer has been used to study residual Stress, microstructure and mechanical properties in thick 6005A-T6 aluminum alloy Friction Stir Welds. Fig.7 shows the application

of residual stress diffractometer in welding of aluminum alloy. These data have good consistency with the results from finite element simulation.

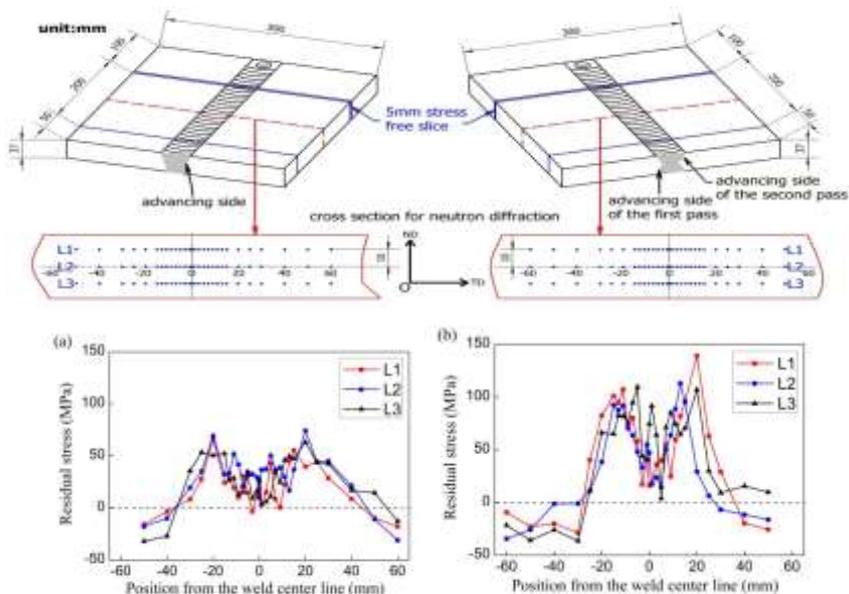


Fig.7 Application of residual stress diffractometer in welding of aluminum alloy

Thirdly, neutron texture diffractometer has been used to study different Mg alloys using different processing technology. Fig.8 shows the application of neutron texture diffractometer in Mg texture analysis. It is

obvious that different Mg Alloys exhibit different texture after rolling. These data are very significant for the process improvement.

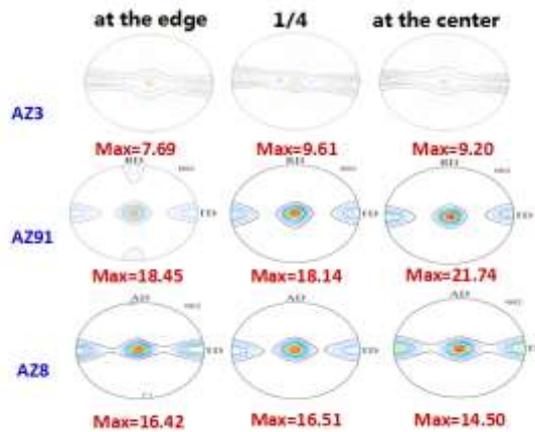


Fig.8 Application of neutron texture diffractometer in Mg texture analysis

Fourthly, neutron imaging facilities have been used to characterize the hydrogen contents and distribution in fuel cladding materials. Fig.9 shows that neutron

imaging of different Zr alloys with different amount of hydrogen. These are very new and unpublished data, which are very crucial for the nuclear power plants.

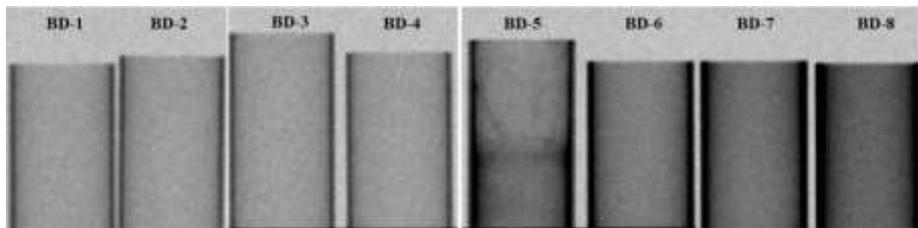


Fig.9 Neutron imaging of different Zr alloys with different amount of hydrogen

Fifthly, Small-Angle Neutron Scattering facility has been used to thermal aging of RPV steel at CARR. Fig.10 shows the nano-scale precipitates in RPV steel. These new and unpublished results have close relation

to the behavior of the RPV steel, which are very important for the analysis of that material.

Kai Sun
(CARR)

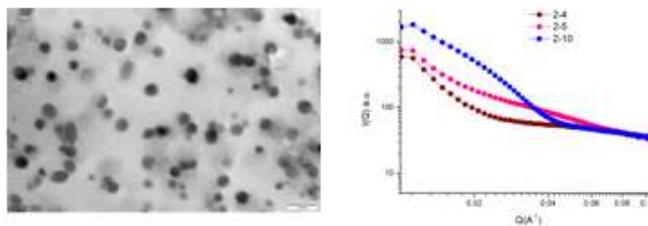


Fig.10 Thermal aging of RPV steel by SANS at CARR

Report from China Spallation Neutron Source

With the completion of all user experiments of three spectrometers on June 26, 2019, China spallation neutron source (CSNS) successfully completed the opening operation task of 2018-2019. The cumulative time of beam delivery on target is 4055 hours with the efficiency of ~92%, the target station produced neutrons with the efficiency better than 99.6%. According to the users experiments' requirements, the three Phase-I spectrometers were calibrated with a variety of sample environments such as high/low temperature, magnetic field and pressure. Two rounds of beam applications were called, and 101 user experiments were done, including of novel LIB's materials, the topological skyrmion magnet, spin Hall magnetic film, nano phase in high-strength alloy, solar cell structure, chip neutron single particle effect, etc. at the same time, preliminary research has also been carried out on aviation materials, combustible ice, shale, catalyst, etc.

CSNS started the first summer maintenance at the beginning of July, 2019. A few of hardware and software were adjusted, tested and maintained to eliminate the problems and hidden dangers that affect the beam power improvement. On August 12, the neutron shutter of the beamline 16, were pulled out to replace its beamport inset since the Multi-Physics Spectrometer (total scattering) will started its installation in the next summer shutdown. It is our first time to deal with neutron shutter under irradiated activation. After careful optimization of beam and machine parameters, especially strict control of beam loss, the accelerator resumed operation in September 2019, entering a new round of open operation (from September 26, 2019 to January 16, 2020). The beam power increased steadily from 50KW before the summer overhaul, reaching 65kW on September 26, and the CSNS operated stably at 80kW after September 27. In this new round, 57 proposals have been selected by outside review from 164 submissions.

Small angle neutron scattering (SANS), as one of three day-one neutron instruments, completed 30 users' topics in the first two rounds of operation, covering new ferromagnetic properties at room temperature with

materials such as metallic glass, high-performance alloy and polymer, shale, solar cell film and polypeptide biology. Prof. Panchao Yin of South China University of Technology has carried out the experiment on the microstructure of the metal organic polyhedron (MOP) / star polymer nanocomposites. Using the unique advantages of contrast matching, we obtained the distribution and nano-scale size of confined polymer molecular chain on MOP surface, provided a theoretical basis for further improving the thermal, mechanical and processability of MOPs. In addition, the thickness and surface roughness of the gas separation membrane prepared by this MOP material were characterized by CSNS multifunctional reflectometer (MR). The works were recently published in *Angewandte Chemie International*

Edition(<https://doi.org/10.1002/anie.201909241>). Prof. Zhaoping Lv of Beijing University of Science & Technology studied the phase transition process in Pd-Ni-P metallic glass and found the reentrant glass transition in metallic glass, our SANS experiment provides an experimental evidence for the transition between two glass states from a wider scale, published online on *Materials Today* (<https://doi.org/10.1016/j.mattod.2019.09.002>).

Multipurpose Refelctometer (MR) has also completed a number of users' experiments, covering spin electronics, multiferrous oxide films, organic solar thin film cells and other research fields. Using polarized neutrons, Prof. Jianwang Cai of Institute of physics, Chinese Academy of Sciences (CAS), relied on MR to study the magnetic structure of YIG films prepared by magnetron sputtering. It was found that the magnetic property was consistent with that of the bulk except a gradual transition interface of less than 2nm (*Appl. Phys. Lett.* 115, 182401 (2019); <https://doi.org/10.1063/1.5124832>). Prof. Jiangyu Li of Shenzhen Advanced Research Institute (CAS), prepared epitaxial films of BTFM-CTO, a room-temperature multiferroic material, by solution method, our polarized neutron reflectivity confirmed that the films have weak the upper limit magnetic moment of $0.07 \pm 0.035 \mu\text{B}/\text{Fe}$

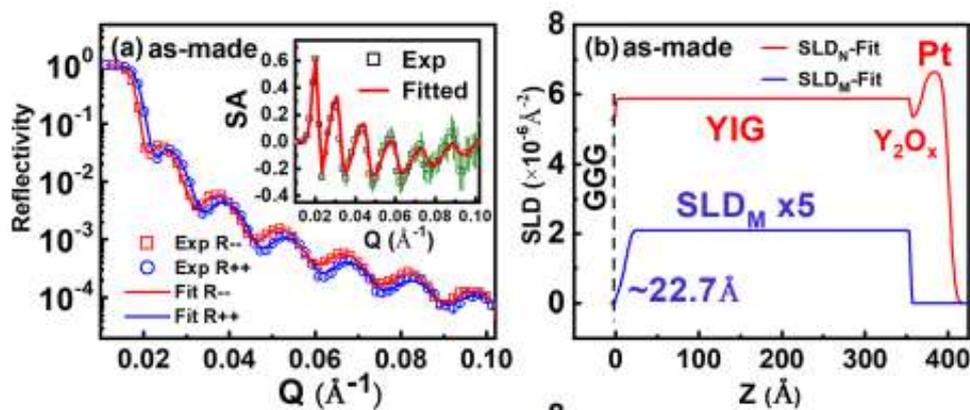


Fig. 1 Polarized neutron reflectivity of GGG/YIG/Pt film

The 6th symposium of CSNS general powder diffractometer was jointly held with Songshan Lake materials laboratory in Xichang, Sichuan Province, during August 12-13, 2019. The meeting was chaired by the academician, prof. Shen Baogen, more than 40 researchers from 17 scientific research institutions at home and abroad attended the meeting. In September 9-10, 2019, CSNS held the Mainland-Hong Kong frontier research forum on neutron / synchrotron facilities and science, sponsored by Natural Science Foundation of China, Profs. Hesheng Chen (CSNS manager) and Wei Guo (president of City University of Hong Kong) chaired this meeting, and more than 40 scientists attended.

The first CSNS neutron school was held in CSNS campus in October 20-26, 2019. Finally 30 students from 27 universities and research institutes (including Hong Kong and Macao) were selected from 98 applicants. Students are mainly doctoral candidates besides a few of postdoctoral and young scientists. The course includes the general introduction of neutron source, the basis of neutron scattering, the basic principles of neutron powder diffraction, reflection and small angle scattering, and data analysis methods. The schedule includes two days of lecture, two days of hands-on experiment, one day of data analysis and discussion, and half a day of report and defense.

F. Wang (CSNS)



Fig. 2 Photograph of the 1st CSNS neutron school

National Facility for Neutron Beam Research (India) - Facility Report

Structural Insight into Silk Fibroin-Sodium Dodecyl Sulfate gelation

A gelling agent is necessary to accelerate sol to gel transition in an aqueous solution of Silk Fibroin (SF), which otherwise takes several days to complete. We have recently investigated the mechanism of gelation of *Bombyx mori* SF by a model anionic surfactant, Sodium Dodecyl Sulfate (SDS) [1]. The preferential binding of SDS to specific regions on the SF chain is observed, which aids structural changes favoring beta sheet formation. The structure of protein-surfactant complexes depends on the interplay of electrostatic as well as hydrophobic interactions between these molecules when mixed. At low concentrations ionic surfactants can denature/alter protein conformations. SANS data of the secondary structure of SF when mixed with SDS has been characterized by the random flight model. This model describes a beads-on-a-string

chain-like complex. The unfolded protein binds the surfactant micelles in the protein-surfactant cluster, forming fibrils, which results in gel formation. The model employed for analyzing SANS data has been described in terms of the changes in the micellar size, the number of micelles formed per cluster and the separation between the micelles in the cluster. Interestingly, the scattering feature of the SF-SDS system at higher SDS concentration significantly differs from that of the lower concentration. With increasing concentration of SDS, micellar size increases and the number of micelles per cluster decreases, thereby reducing the propensity of fibril formation. This is in agreement with the observation of longer gelation time at higher SDS concentration in rheological experiments.

S. M. Yusuf (NSSI)

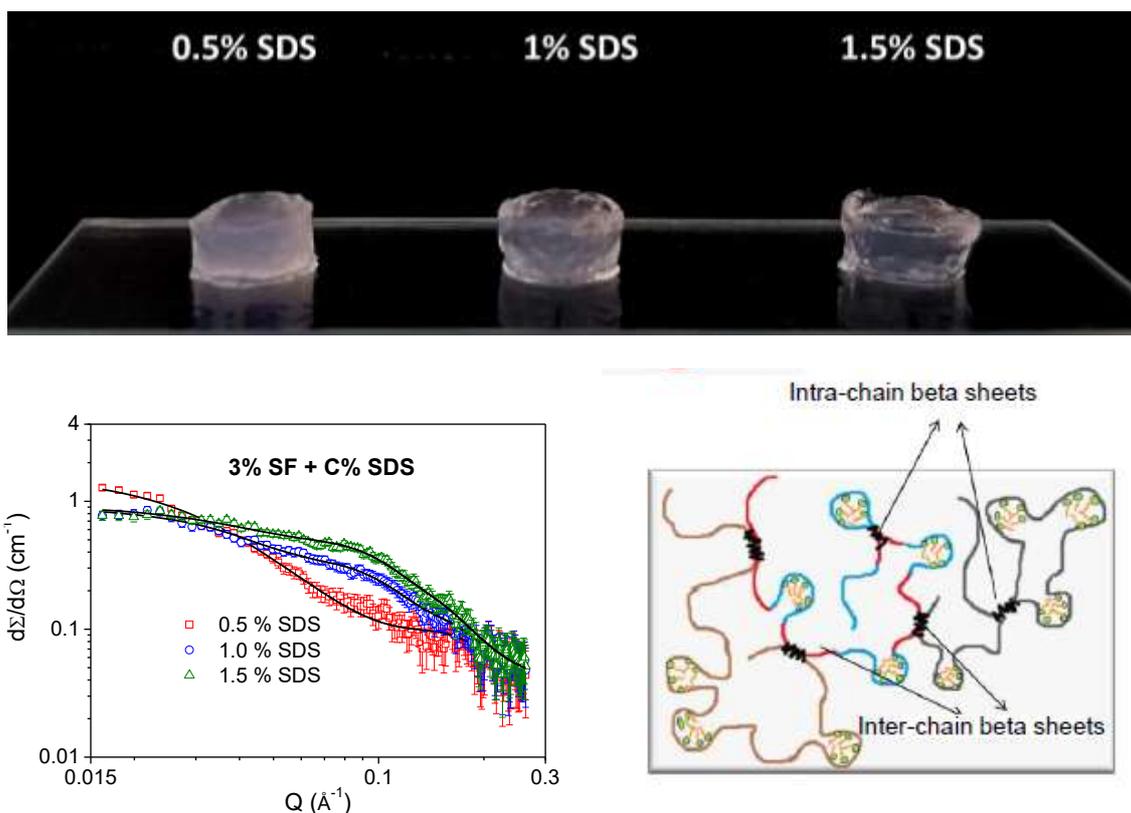


Fig 1. (Top panel) SF-SDS hydrogels with 3 w/v% SF. (bottom panel) (Left) SANS data and model fits for hydrogels using 3% w/v SF with varying concentrations of SDS. (Right) Schematic of interaction between SF chain and SDS molecules.

[1] S. Hirlekar, D. Ray, V. K. Aswal, A. A. Prabhune, A. Nisal and S. Ravindranathan, *Langmuir* 2019. doi.org/10.1021/acs.langmuir.9b02402

BATAN's Neutron Scattering Laboratory - Facility Report

In this volume, several activities will be briefly reported.

Researchers from battery research group in collaboration with neutron instrument scientists had investigated the performance of certain composition of samples using High Resolution Powder Diffractometer as shown in Figure 1. The purpose of the experiments is to understand the mechanism of in-situ charge-discharge in Li-ion battery.



Fig. 1. HRPD to study charge-discharge mechanism on Li-ion battery.

In last two years, the Center for Science and Technology of Advanced Materials - CSTAM team has been established the synthesis procedure in making microsphere for kernel nuclear reactor fuel. Instead of using uranium, the CSTAM team use zirconium oxide that is stabilized with cerium oxide as surrogate to establish the synthesis procedure. SANS technique has been applied on characterizing the nano-structure of ceria stabilized zirconia (CSZ) microsphere in each step of the synthesis process. The SANS technique has revealed the mechanism of the nano CSZ forming a bigger grain in the calcinations process. Figure 2 shows

one set up of the experiment at SANS.

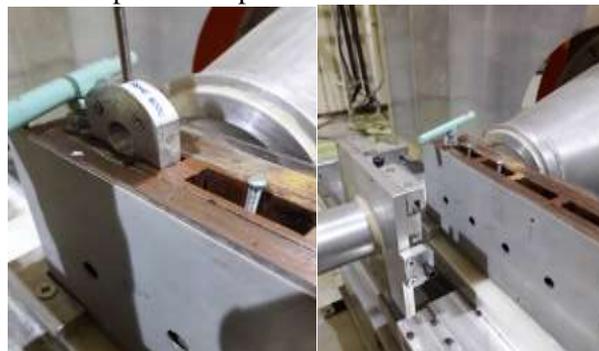


Fig. 2. SANS technique to characterize the nano-structure of ceria stabilized zirconia (CSZ) microsphere.

Neutron Radiography facility has been used to study the archeological sample i.e. teeth that is more than 9600 years old, as shown in Figure 3 (left) and the fuel cell (right) to study water management in hydrogen fuel cell. These are a collaborative works with researchers from National Archaeological Division of the Ministry of Culture and the Agency for the Assessment and Application of Technology – Indonesia, respectively.



Fig. 3. Investigation of 9600 years old teeth (left) and water management in hydrogen fuel cell (right) using neutron radiography.

Dr. Iwan Sumirat, Head of BATAN Neutron Scattering Facility attended the IAEA Consultancy Meeting on the Development of a Publication on Neutron Scattering with Low and Medium Flux Neutron Sources at its Headquarters in Vienna, Austria, from 11 to 15 November 2019. The purpose of the meeting was to

review the status of the drafting of the publication “Neutron Scattering with Low and Medium Flux Neutron Sources”, identify gaps and establish a work plan for its finalization. The meeting was attended by 4 participants from 4 Member States i.e. Indonesia, Argentina, South Africa, and Hungary, that own and operate research reactor or accelerator-based neutron sources used for neutron scattering or neutron spectroscopy and IAEA officials (Figure 4).

On December 3, 2019 three neutron instruments i.e. Residual Stress Diffractometer, Neutron Radiography-Tomography, and Neutron Activation Analysis participated in the Workshop BATAN – IAEA Collaborating Center on Non Destructive Investigation 2019 as shown in Figure 5. Many industries especially manufacture industries attended the workshop and several plans of collaborative works had been agreed.



Fig. 4. IAEA Consultancy Meeting on the Development of a Publication on Neutron Scattering with Low and Medium Flux Neutron Sources.



Fig. 5. Neutron instruments at Workshop BATAN – IAEA Collaborating Center on Non Destructive Investigation 2019.

Iwan Sumirat
(BATAN)

