Engineering and Physical Sciences (EPS) Committee
Professor Roland Kröger

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Our committee represents the broad and interdisciplinary engineering and physical science community, who use advanced microscopy- and spectroscopy-based techniques to address engineering and physical science problems. It is engaged in a wide range of EPS activities such as workshops, seminars and conference sessions concentrating on scientific themes that aim to improve our understanding of materials, machines and engineering systems including Energy and Energy storage, Biomaterials, Structural/Geological materials, Advanced 3D manufacture, Devices, and Surface Engineering.

This year was, like 2020, strongly impacted by the pandemic, and restricted all activities to online events. However, I am pleased to state that the EPS section has been extremely engaged in adapting to the situation and, particularly with the strong presence at mmc2021 and new activities across the committees, demonstrate that the EPS section members are highly active in promoting microscopy in the engineering and physical sciences.

Past events

EBSD workshop

This event took place between 20 – 21 April 2021 and was held virtually with 137 delegates. The meeting went very well, and feedback received has been really positive and the organisers were very pleased with attendance and engagement in discussions.

mmc2021

Two sessions for mmc*2021* were organised by members of the EPS section, namely the *Volume Imaging* session (Dr Xiangli Zhong) and the *X-Ray microscopy* session (Dr Julia Parker together with Dr Liz Duke). The Volume Imaging session went very well with the third most number of participants of all mmc2021 sessions. This session impressively showcased the application of 3D imaging across the length-scales and materials system. Also, the *X-Ray microscopy* session was very successful and provided an intriguing insight into the application of synchrotron-based materials characterisation across a wide range of applications. Furthermore, Dr Trevor Almeida was also involved in EMAG sessions at mmc2021.

Dr Nyree Manoukian represents the EPS section on the Early Career Committee, which showed a strong presence during the conference engaging in promoting activities to support young researchers during a very successful pre-congress symposium.

The *EPS Medal for Innovation in Applied Microscopy for Engineering and Physical Sciences* was awarded to Dr Wing Chung Tsoi (Swansea University) for his contributions to advanced quantitative Raman microscopy mapping techniques. He gave an invited presentation at mmc2021 where the medal was awarded.

SNAIA2020 (Microscopy and Microspectroscopy of Nanomaterials Symposium)

In partnership with the STEMM Global Scientific Society a 2-day symposium focused on an emerging field of microscopy; the in-situ characterisation of novel smart nanomaterials based systems and devices was held at the Smart Nanomaterials Conference. Due to continuing travel restrictions, the

symposium took place in a virtual format. The symposium covered fundamental techniques such as optical microscopy, TEM, SEM, AFM, Raman, and FTIR for a wide range of possible applications, from chemistry and material fabrication to in-situ systems engineering. The symposium attracted more than 100 conference delegates.

***SPb-POEM2021* (Microscopy and Microspectroscopy Symposium)**
The Novel Photonic, Optoelectronic and Electronic Materials SPb-POEM conference took place in via a hybrid onsite-online format on 25-28 May 2021 at the National Research University Higher School of Economics in St. Petersburg, Russia. The *Microscopy and Microspectroscopy Symposium* was co-organised and supported by the EPS RMS. It attracted more than 400 researchers from around the world.

Current activities

The International Microscopy Focus Lecture Series is developing well and has made a promising start. Professor Roland Kröger and Professor Grace Burke are currently involved in the organisation of an international webinar-based Materials Science/Life Science Programme together with former EPS section member and now Chair of the Microscopy Society of Canada (Dr Natalie Reznikov) and the Israel Society of Microscopy (Dr Yaron Kaufman), to start in October 2021. Five high-profile speakers have already been secured and the preparation for recording presentations and interviews are well under way. A strong interest has been expressed by other microscopy societies to join us with this initiative and as soon as the first lectures have been realized it will be discussed how this can be developed.

To address the needs of microscopists in the field of planetary materials and archaeological science Dr Duncan Muir, Dr Nyree Manoukian and Professor Roland Kröger have organised a meeting on *Microscopy and Microanalysis in Geological and Archaeological Materials* focused event to take place in November 2021. This event has been announced and with fantastic support from the RMS a flyer has been prepared and circulated and online registration is now open.

Resulting from our joint section committee meeting with the EM Section in 2019 Dr Dogan Ozkaya is currently preparing a workshop on Microanalysis in Spring 2022.

As previously highlighted a Correlative X-ray EM session is planned to be hosted at Diamond post COVID. Dr Parker would like to pursue this for next year, potentially April 2022, dependent on the pandemic situation.

Dr Fabio Nudelman, jointly with Professor Roland Kröger, is currently preparing a proposal of *Faraday Discussions* as a joint event with the RMS on *Imaging of Biomineralisation* to take place in 2024 or 2025.

The EPS section will co-organise the Microscopy and Microspectrocopy of Nanomaterials Symposium at the SNAIA2021 conference, which will take place in hybrid format at the Paris Chemie Tech in Paris on 7-10 December December 2021. The conference and the symposium are chaired by Dr Anna Baldycheva. The EPS Section will award a special RMS prize for the best student talk.

Focused Interest Groups

As a joint effort between the EM and the EPS section the *X-ray Focused Interest Group* (FIG) has been created, set up under the lead of Dr Liz Duke (DLS, EM committee) jointly with EPS section member Dr Julia Parker. This FIG has met several times in 2021 resonating well across the two committees and was instrumental in organising a joint session at mmc2021.

Professor Inkson is leading an effort in establishing a FIG on *Ion Beam Microscopy*. A meeting has already taken place to discuss the aims of the FIG which includes creating a roadmap, surveying the UK Community to find out what is needed and looking at potential links with other FIGs.

Outreach

EPS section members, in particular Dr Owen Green, are strongly active in outreach activities. This includes engagement in the Outreach and Training FIG. Specific topics are microscopy kits for schools (MAKS) and the table-top SEM initiative (developed by Alex Ball and James Perkins), which is very well received and is supported by Hitachi.

The EPS Committee also has planned outreach microscopy activities for children aged 5-17 years old in partnership with STEMM Junior and City Councils. The first outreach event is planned in the city of Southampton supported by Southampton City Council.

In conclusion I am grateful for all EPS committee members for their wide-ranged and highly motivated engagement and who show such an impressive level of creativity and positivity under the current difficult circumstances. The committee is also well-supported by the RMS team, in particular Allison Winton and Amanda Jarman, who continue to make crucial contributions so that events and committee meetings run smoothly.

Professor Roland Kröger
Chair, EPS Committee