

Introduction to the Proceedings of CISCEM 2021 - the 5th Conference on *In-Situ* and Correlative Electron Microscopy

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The 5th Conference on *In-Situ* and Correlative Electron Microscopy (CISCEM) took place in Paris, France, from September 8 to 10, 2021. [1] The growing CISCEM community met at the University of Paris to share a broad variety of scientific results and discuss future directions of *in situ* and correlative electron microscopy research. The hybrid format of the conference with 75 on-site and 57 remote participants made it possible to bring together an international consortium despite the worldwide restrictions due the global health crisis. The rich interdisciplinary program of CISCEM at the interfaces between biology, materials science, chemistry, and physics is summarized in the 53 abstracts published in these proceedings.

In the continuity of the last four biennial conferences, the topics of CISCEM 2021 include dynamical nanoscale (and atomic-scale) studies of biological samples and functional materials under realistic or near realistic conditions, for example, in gaseous environments, at elevated temperatures, and in liquid. Progress in the field benefits from cross fertilization of expertise and ideas obtained using the different available methods for time-resolved imaging of physical, chemical and biological processes, thus inspiring development of new capabilities across disciplines. The present proceedings reflect the main questions discussed in Paris: Beyond structural biology, can obtain novel information about the function of proteins and cells with *in-situ* TEM? How can we study the dynamics of beam sensitive soft/bio materials? How to provide quantitative and multiscale information on nanomaterial synthesis? How can we investigate the full life cycle of materials in their application media? How time and spatial resolutions in complex environment can be extended using technical developments or artificial intelligence? What are the opportunities and challenges of correlative approaches involving *in-situ* TEM and other environmental techniques?

The topics of the scientific sessions covered 6 main themes:

- Dynamics soft matter and biological specimens
- Nucleation, growth and self-assembling of Nanomaterials
- Behavior of nanocatalysts under reaction conditions
- Transformation degradation and life cycle of materials
- X-ray and near field in situ techniques and correlative approaches
- TEM innovations to study materials properties in situ

Invited speakers were:

- Anat Akiva, Radboud Institute for Molecular Life Sciences, Nijmegen, The Netherlands
- Qian Chen, University of Illinois Urbana-Champaign, Urbana, IL, USA
- Steve Granick, IBS Center for Soft & Living Matter, Ulsan, Republic of Korea
- Jinghua Guo, LBNL, Advanced Light Source, Berkeley, CA, USA

- Adam Hitchcock, McMaster University, Hamilton, Ontario, Canada
- Thomas Juffmann, University of Vienna, Austria
- Frédéric Kanoufi, Université Paris Diderot, Paris, France
- Sercan Keskin, INM – Leibniz Institute for New Materials, Saarbrücken, Germany
- Xiaoqing Pan, University of California, Irvine, CA, USA
- Lorena Redondo-Morata, Institut Pasteur de Lille, France
- Frances Ross, MIT, Cambridge, MA, USA
- Lorena Ruiz-Perez, University College London, UK
- Marc Willinger, ETH Zürich, Switzerland

The scientific organization committee was:

- Dr. Damien Alloyeau, CNRS - Université de Paris, France
- Prof. Kristian Mølhave, DTU - Technical University of Denmark, Lyngby, Denmark
- Prof. Niels de Jonge, INM – Leibniz Institute for New Materials, Saarbrücken, Germany

Please note that the proceedings do not contain all abstracts of CISCEM because several authors preferred not to publish their abstract. The full conference program is available at <https://www.ciscem2021.de/>

References:

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Figure 1. Group photo of CISCEM 2021 acquired during the gala dinner at the Orsay Museum.