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**IAMNano 2019 Düsseldorf**

**International Workshop on Advanced and *In situ* Microscopies of** **Functional Nanomaterials and Devices**

**October 27 – 30, 2019**

**Venue:** Max-Planck-Institut für Eisenforschung,

Max-Planck-Str. 1, 40237 Düsseldorf, Germany

[**https://www.mpie.de/iamnano2019**](https://www.mpie.de/iamnano2019)

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**Scope of the workshop**

The workshop aims to provide a forum for researchers who are interested in applying advanced imaging and spectroscopy methods of electron microscopy, including aberration-corrected, *in‐situ*, environmental and low-voltage electron microscopy, to topical issues in materials science and engineering, in nanoscience, in soft matter research, in interface and surface science, and in biomaterials research. As these methods are of fundamental importance in virtually all technological fields, contributions are invited that address the broad spectrum of current materials research. Novel methodological developments will be discussed as well as topical areas of research on thin films, bulk materials, surfaces, materials at the nanoscale and at the interface between the physical and life sciences, for understanding structure‐property relationships of materials, as well as for metrology. Selected topics will be introduced by invited keynote speakers during the plenary sessions. A poster session provides room for the presentation and discussion of current research on

* New developments in aberration-corrected transmission electron microscopy (TEM) and scanning TEM (STEM)
* Advanced spectroscopy including energy dispersive X-ray spectroscopy (EDS) and electron energy loss spectroscopy (EELS)
* Electron holography and phase retrieval
* *In situ* and environmental TEM
* Computational microscopy and advanced data analysis
* Multiscale characterisation
* Materials for sustainable energy applications and mobility
* Advanced engineering materials
* Soft and biological materials

**Local organizing committee** Gerhard Dehm - MPIE Düsseldorf

(alphabetical order) Christian Liebscher - MPIE Düsseldorf

Christina Scheu - MPIE Düsseldorf / RWTH Aachen

Bernhard Völker - RWTH Aachen

**Scientific Advisory Board** Rafal Dunin-Borkowski - Ernst Ruska Center Jülich, Germany

(alphabetical order) Gunther Eggeler - Ruhr Universität Bochum, Germany

Wolfgang Jäger - CAU University of Kiel, Germany

Joachim Mayer - RWTH Aachen / FZ Jülich, Germany

Eva Olsson - Chalmers University, Sweden

Dierk Raabe - MPIE Düsseldorf, Germany

Jochen Schneider - RWTH Aachen, Germany

Robert Sinclair - Stanford University, USA

**Contact information**  e-mail: [iamnano2019@mpie.de](mailto:iamnano2019@mpie.de)

Preliminary Conference Program

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**Oct 27 , 2019 SUNDAY** 13.30 – 16.30 Registration

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13.30 – 16.30 Registration

**14.15** – **14.30 OPENING REMARKS & WELCOME** Chair

**Opening Session POTENTIALS OF ABERRATION-CORRECTED (S)TEM** Chair

14.30 – 15.00 Harald Rose (TU Darmstadt, Germany)

*Minimum-dose phase-contrast tomography by numerical optical sectioning employing a Cc/Cs-corrected STEM and a pixelated detector*

15.00 – 15.30 Max Haider (CEOS Heidelberg, Germany)

*Advancement of high resolution Electron Microscopes*

15.30 – 16.00 Ute Kaiser (Universität Ulm, Germany)

*Understanding properties of low- dimensional materials by low voltage TEM*

16.00 – 16.30 **COFFEE BREAK**

16.30 – 17.00 Kazu Suenaga (AIST Tsukuba, Japan):

*Angular-resolved EELS of low-dimensional materials by means of low-voltage STEM*

17.00 – 17.30 Joanne Etheridge (Monash University)

*Tuning STEM: Tailoring the incident and scattered wave fields for optimum specimen information*

17.30 – 18.00 Colin Ophus (Lawrence Berkeley National Laboratory, USA)

*Phase reconstruction and simulation of STEM experiments in 2D and 3D using the scattering matrix formalism*

18.00 – 18.30 Chunlin Jia (Xi’an University & FZ Jülich, China & Germany):

*Quantitative HRTEM of functional oxides using negative Cs imaging*

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**Oct 28, 2018 MONDAY** 08.30 – 10.00 Registration

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**Session 1 ELECTRON HOLOGRAPHY, DPC, MAGNETIC STRUCTURES** Chair

09.00 - 09.30 Christoph Koch (HU Berlin, Germany)

*Computer-assisted imaging and spectroscopy in the TEM*

09.30 - 10.00 Rafal Dunin-Borkowski (FZ Jülich, Germany)

*Title to be announced*

10.00 - 10.30 Jozef Zweck (University Regensburg)

*Recent developments in imaging of magnetic and electric fields*

16.00 – 16.30 **COFFEE BREAK**

**Session 2 *IN SITU* AND ENVIRONMENTAL TEM** Chair

11.00 - 11.30 Sang Ho Oh (Sungkyunkwan University, South Korea)

*In-situ atomic-scale observation of polar surfaces of oxides at high temperatures*

11.30 – 12.00 Eva Olsson (Chalmers University, Sweden):

*In situ studies of electrical and optical properties of Quantum Devices*

12.00 – 12.30Robert Sinclair (Stanford University, USA)

*The influence of electrochemical testing on the structure of oxide, sulphide and nitride thin films, and prospects for in situ studies*

12.30 – 13.30 **LUNCH BREAK & DISCUSSIONS**

**Session 3 STRUCTURAL MATERIALS & MECHANICAL PROPERTIES** Chair

13.30 – 14.00 Hamish L. Fraser (Ohio State University, USA)

*Nanoscale structural instabilities in metastable beta titanium alloys and their role in providing both strengthening and low elastic modulus*

14.00 – 14.30 Guillaume Laplanche (Ruhr Univeristät Bochum, Germany)

*TEM investigations of microstructural evolution during tensile deformation of high- and medium-entropy alloys*

14.30 – 15.00 Christoph Kirchlechner (MPI Eisenforschung, Germany)

*Twin boundaries: obstacles for or sources of dislocations*

15.00 – 15.30 Bernhard Völker (RWTH Aachen, Germany)

*In-situ SEM study of the fracture behaviour of Cr2AlC coatings*

15.30 – 16.00 **COFFEE BREAK**

**Session 4 BIOMATERIALS AND SOFT MATTER**

Chair

16.00 – 16.30 Jürgen Plitzko (MPI Biochemie Martinried, Germany)

*In situ structural biology - Cryo-electron tomography of cells and tissue at molecular detail*

16.30 – 17.00 Martin Müller (Helmholtz-Zentrum Geesthacht, Germany)

*Title to be announced*

17.00 – 17.30 Fu-Rong Chen (City University Hong Kong, China)

*Toward atomic resolution dynamics for soft materials*

**17.30** – **18.30 Selected contributed presentations**  Chair

**18.30 – 20.30 Poster Session - contributed posters**

**GET TOGETHER**

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**Oct 29, 2018 TUESDAY** 08.30 – 10.00 Registration

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**Session 5 STEM IMAGING AND ANALYSIS**

Chair

09.00 – 09.30 Andreas Rosenauer (Universität Bremen, Germany):

*ISTEM - theory and practice*

09.30 – 10.00 Haijun Wu (National University Singapore, Singapore)

*STEM analysis of thermoelectrics and piezoelectrics*

10.00 – 10.30 Dagmar Gerthsen (KIT Karlsruhe, Germany)

*STEM, FIB-SEM and EDXS tomography of solid oxide fuel cells*

10.00 – 10.30 **COFFEE BREAK & DISCUSSIONS**

**Session 6 MATERIALS FOR ENERGY APPLICATION**

Chair

11.00 – 11.30 Kerstin Volz (Universität Marburg, Germany)

*4D-STEM for energy materials*

11.30 – 12.00 Elena Tchernychova (National Institute of Chemistry, Slovenia)

*Title to be announced*

12.00 – 12.30 Thomas Klassen (Helmut-Schmidt-Universität Hamburg, Germany)

*Nanostructured photoactive coatings for solar water splitting*

12.30 – 13.30 **LUNCH BREAK**

**Session 7 SPECTROSCOPY** Chair

13.30 – 14.00 Gianlugi Botton (Canadian Light Source, University of Saskatchewan and Canadian Centre for Electron Microscopy, McMaster University, Canada)

*Using electrons and photons for materials characterization: where do we think we stand?*

14.00 – 14.30 Simon Ringer (University of Sydney, Australia) to be confirmed

*Title to be announced*

14.30 – 15.00 Mathieu Kociak (Laboratoire de Physique des Solides, France)

*Advances in high resolution electron spectroscopies: EELS, EEGS and CL*

15.00 – 15.30 Quentin Ramasse (SuperSTEM, UK)

*Monochromated electron energy loss spectroscopy at high spatial resolution*

15.00 – 15.30 **COFFEE BREAK**

**Session 8 CORRELATIVE MICROSCOPY & ATOM PROBE TOMOGRAPHY** Chair

16.00 – 16.30 Julie Cairney (University of Sydney, Australia)

*Extreme room temperature deformability in ferroelectric oxide pillars*

16.30 – 17.00 Christian Liebscher (MPI Eisenforschung, Germany)

*Grain boundary phase transitions in metallic materials*

17.00 – 17.30 Williams Lefebvre (University Rouen, France)

*Title to be announced*

17.30 – 18.00 Thomas Kelley (Amatek, USA)

*Project Tomo: Atom Probe and TEM to Be Combined at Last*

**19:30 CONFERENCE DINNER**

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**Oct 30, 2018 WEDNESDAY** 08.30 – 10.00 Registration

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**Session 9 ADVANCED MATERIALS 1 - ALLOYS & STEELS** Chair

09.00 – 09.30 Joachim Mayer (RWTH Aachen, Germany)

*White etching areas - the mistery of premature bearing failures*

09.30 – 10.00 Stefanie Sandlöbes (RWTH Aachen, Germany)

*Title to be announced*

10.00 – 10.30 Sophie Primig (UNSW Sydeny, Australia)

*Microstructure control during advanced manufacturing*

10.00 – 10.30 **COFFEE BREAK**

**Session 10 INTERFACES AND NANOSTRUCTURES**

Chair

10.30 – 11.00 Uli Dahmen (Lawrence Berkeley National Laboratory, USA)

*Observations on the structure of the Ag-Ni interface*

11.00 – 11.30 Sandra van Aert (University of Antwerp, Belgium):

*3D atomic scale quantification of nanostructures and their dynamics using model-based STEM*

11.30 – 12.00 Damien Alloyeau (University Paris, France):

*Reveal the behavior of nanomaterials in their formation and application media with a TEM*

12.00 – 12.30 Patricia Kooyman (University of Cape Town, South Africa)

*Development of operando gas-phase TEM and applications in catalysis research*

12.30 – 13.30 **LUNCH BREAK & DISCUSSIONS**

**Session 11 INTERFACES AND NANOSTRUCTURES II** Chair

13.30 – 14.00 Heike Gabrisch (Helmholtz-Zentrum Geesthacht, Germany)

*Microstructural evolution within alpha2 lamellae of a gamma-TiAl alloy*

14.00 – 14.30 Grace Burke (University of Manchester)

*Title to be announced*

14.30 – 15.00 Erdmann Spiecker (Universität Erlangen-Nürnberg, Germany)

*In situ electron microscopy of nanomaterials in SEM and TEM: New approaches and applications*

15.00 – 15.30 Wolfgang Jäger (Universität Kiel, Germany)

*Growth and defect phenomena in heteroepitaxial CVD diamond for magnetometry and quantum science*

**CONCLUDING REMARKS, COFFEE & FAREWELL**

**END OF WORKSHOP**