CHALMERS
UNIVERSITY OF TECHNOLOGY

Name of the keynote speaker: Eva Olsson
Affiliation:

Short Biography

Professor Eva Olsson received her M.Sc. in Engineering Physics and Ph.D. in Materials Science at the Department of Experimental Physics from Chalmers University of Technology (Gothenburg, Sweden). She was a postdoc at IBM Thomas J. Watson Research Center, Physical Sciences, Yorktown Heights (New York, USA) for two years whereafter. She was appointed Assistant Professor and Associated Professor at the Department of Experimental Physics at Chalmers University followed by a Full Professor at the Ångström Laboratory, Uppsala University, Sweden. Later she was appointed Full Professor at Department of Physics, Chalmers University. She was Professorial Fellow at The University of Tokyo (Japan) in 2017 and the John Cowley Distinguished Lecturer at Arizona State University (USA) in 2024. Professor Olsson is currently a Full Professor of Experimental Physics and is currently the Head of the Division of Nano and biophysics at the Department of Physics and also the Chair of the Faculty Senate Advisory Board at Chalmers University. She is mainly interested in materials for emerging technologies, including catalysis, photovoltaic and quantum devices and her research group focuses on the development of novel characterisation techniques for these materials. Professor Olsson works with electron microscopy including in situ studies and quantitative imaging and spectroscopy. She is presently the President of the International Federation of Microscopy Societies (IFSM).

Title of the keynote talk:

Enabling Site-Specific Correlation Between Atomic Structure and Properties Using Electron Microscopy

Abstract of the keynote talk

In situ electron microscopy enables the site-specific correlation between atomic structure and properties. Developments of capabilities to manipulate and stimulate by, for example, electric fields, light, mechanical strain and temperature in the electron microscope allow quantitative studies of the active atomic structure using different imaging, spectroscopy and diffraction modes. The spatial resolution of the imaging modes is better than 1 Å and the precision in determining the position of atoms can be better than 1 pm. These capabilities are used to study the role of material phases as well as individual atoms, molecules, defects and interfaces in determining the properties. Electron tomography is used to determine the 3-dimensional structure of the materials and spectroscopy provide further information about structure and properties with sub-nano resolution. The obtained knowledge is used to tune the properties of advanced materials and devices. Catalytic activity of metal nanoparticles and electrical properties of semiconducting nanowires are examples where the strain induced effects have a strong influence on the properties and performances. Electric fields can change the surface structure of materials and the thermal handling capabilities can be changed by the presence of a one atomic layer thin surface film. New aspects of material properties and mechanisms, not obvious from measurements on the macro scale, can therefore be revealed using the high resolution and *in situ* electron microscopy. The knowledge is crucial for not only the understanding of the mechanisms that are involved but also for the design of materials and devices with tailored properties.