

***In-situ electron microscopy of hard and soft matter***

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**4 December 2015**  
**1:00-2:00pm**

**Zupnik Lecture Hall**  
**Kim Engineering Building**

In situ electron microscopy allows the direct observation and correlation between material structure and properties on small scales reaching the atomic level. Examples of important mechanisms that can be studied are those of transport properties of matter and charges in complex structures and also of light induced effects and mechanical strain induced changes of charge transport properties. The direct correlation on the small scale involving individual interfaces, defects and atoms provides access to new information about which microstructural constituents that are active in determining the material properties on the macro, micro, nano and atomic scale. New aspects of transport mechanisms not obvious from measurements on the macro scale can also be revealed by the high spatial resolution. 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. The need for high spatial resolution imaging and spectroscopy of both surfaces and internal structure can in many cases only be met by transmission electron microscopy (TEM) or a combination of electron microscopy and other techniques. TEM holders for in situ dynamic experiments and manipulation including studies of transport of charges and condensed matter further expand the dimensions of information that can be extracted. This talk will address method developments enabling studies of water interaction with soft biomaterials, electrical and thermal transport measurements and optical experiments for the study of light induced effects in scanning electron microscopes and TEMs. Different aspects of specimen geometries and electron beam effects for the correlation between structure and properties will also be discussed.

**Presented by**  
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