



### ***In-situ* TEM materials characterization in liquid and gas**

In this workshop, an overview of advances in *in-situ* transmission electron microscopy (TEM) materials characterization in liquid and gas environments will be presenting. Conducting real-time observation of materials interactions at nano-meter scale resolution in their native gas or liquid environment has been attracting increasing attention across the fields of the physical and biological sciences. Key to these recent advances have been commercially available TEM specimen holders that can be used with existing TEMs. Hummingbird Scientific has been at the forefront of these developments and has recently added additional *in-situ* capabilities to these platforms, such as biasing and heating. This has enabled *in-situ* TEM research into electrochemistry and catalysis. Examples of different applications as well as an equipment overview will be presented.



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