New innovations are transforming the Transmission Electron Microscope (TEM) from a simple high-resolution image acquisition tool into a nanoscale materials research and development laboratory.
Researchers can now better understand material behavior by analyzing samples in real-world gas or liquid environments, at high temperature and with ultra-low noise electrochemical and electrical biasing techniques.
Newly developed in-situ tools give the opportunity to conduct materials research in highly controlled environments, at high resolution and without sacrificing the analytical capabilities of the TEM (such as EDS).
Applications for these tools include heterogeneous catalyst reactions, imaging of living cells, nanostructure nucleation and growth, battery and fuel cell materials, high temperature nanoparticle behavior, soft materials, and semiconductor devices.
In this presentation we show the most recent results acquired using gas cells, flowing liquid and electrochemistry cells, and heating and electrical biasing systems.
Sample preparation methods using Focused Ion Beam techniques were developed to address the different challenges emerging from in-situ experiments. We will show that high quality TEM foil containing a singular resistive memory device can be prepared and connected to an heating and electrical biasing holder in a few hours, with seamless integration of in-situ measurement data into TEM camera images.