Integrated AFM in SEM - Correlating Electron Micros and Associated Analysis Techniques with 3D Imaging Data

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Investigating modern materials using Atomic Force Microscopy (AFM) is a common technique utilized in many labs in a wide range of research fields. Often times it is desirable to obtain multiple data sets from the same site using various imaging or analysis techniques. Especially when using Scanning Electron Microscope (SEM) based techniques, it can be difficult to (re-)locate the specific area of interest when using separate microscopes.

Thus, integrating an AFM into an SEM yields an easy way to address new correlative microscopy workflows. Another advantage of using an AFM inside an SEM is the latter's ability to quickly image large areas thus making it very easy to locate the Region of Interest (ROI). In some cases, the ROI is only visible using SEM based analyses such as Energy Dispersive X-ray spectroscopy (EDX) or Electron Backscatter Diffraction (EBSD).

This work will showcase some application examples of an integrated AFM system based on piezo-resistive force measurement cantilevers. The AFM platform can be loaded into any SEM in the same manner as a sample would be mounted onto the SEM's stage. This ease of use is critical for day-to-day operations - especially inside multi-use SEMs often found in research environments.

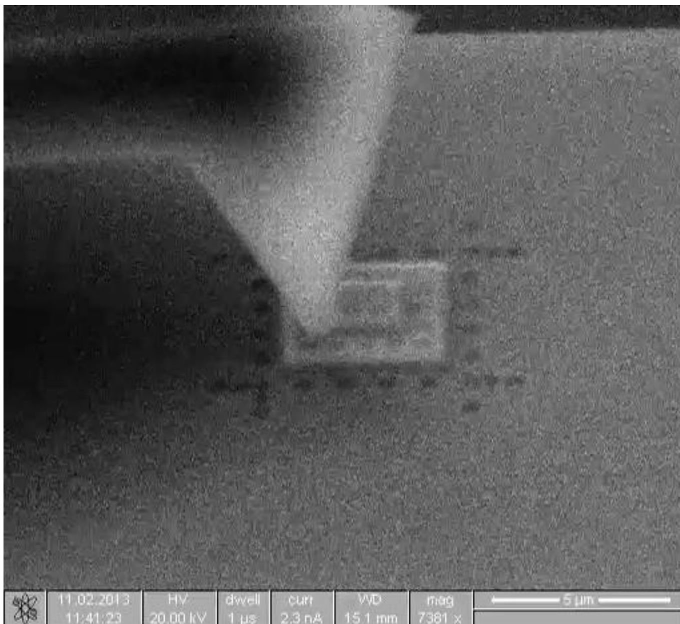

Fig. 1: AFM tip imaged using SEM while scanning a calibration sample.

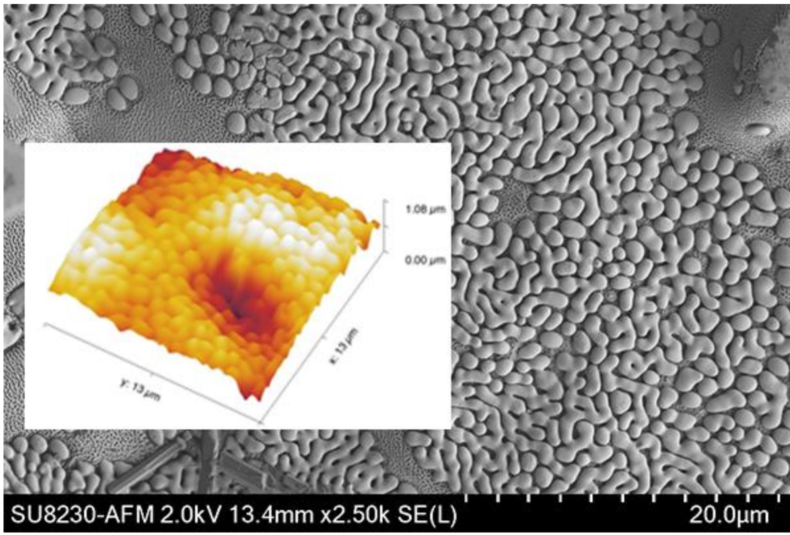

Fig. 2: SEM image of an SiO2 sample with the resulting AFM image overlayed.