Extreme Large 2D and 3D Nanoscale Application

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Modern microscopy labs are typically outfitted with a suite of instruments, capable of capturing data across a range of length scales in 2D- and 3D, from the centimeters to the sub-nanometers. These imaging instruments are often complimented by analytical techniques, such as spectroscopic chemical characterization platforms or mass spectrometry and are designed to produce a comprehensive depiction of the material under investigation.Recently, a novel multi-beam SEM (MSEM) technology for imaging of large sample areas has been developed by ZEISS. The MultiSEM family features 61 or even 91 electron beams scanning in parallel, resulting in an imaging throughput of up to 2 TeraPixels per hour (s. ref.) is now achievable, therefore enabling extremely large-scale imaging experiments in 2D and 3D. Here, we present a unique advancement enabling correlative microscopy, which uses a centralized software platform to pull together data from light-, electron-, Ion-, and X-Ray Microscopy (XRM). Beyond just correlating the various datasets, the approach allows data from one technique to be used to drive the hardware in another technique, facilitating easy transfer of information between the suite of available microscopes and the operator. The presentation will give an overview of the current state of the technology, its potential application space and the challenges in data handling imposed by the enormously increased data rate.

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[1] K. Crosby, A. Eberle, D. Zeidler , Multi-beam SEM Technology for High Throughput Imaging. MRS Advances, 1 (2016) (26):1915–1920.