WORKSHOP

LATEST DEVELOPMENTS IN S/TEM DETECTION EFFICIENCY FOR IMAGING AND ANALYSIS IN MATERIALS SCIENCE APPLICATIONS

Dominique Delille

FEI

With Materials Scientists International Community showing growing interest for higher resolutions, lower working high tensions, new imaging methods, and given the highly dynamic development of multi-purpose in-situ holder suppliers, FEI has recently released its latest state-of-the-art high end S/TEM : Themis Z is born, and will be capable of answering most of present and future needs in terms of producing fast, sensitive and unrivaled quality data from challenging samples.

With the unprecedented TEM and STEM spatial resolutions from 300 kV down to 30 kV, Themis Z provides the best resolving power for any materials science specimen. STEM defocus and aberrations (up to all second order) are shown to be corrected automatically and reproducibly with OptiSTEM+ software with a single click, making it possible to get the best out of the microscope at each image. Another user-friendly application, OptiMono, automatically and reproducibly excites the monochromator for HR-EELS studies (plasmonics, band gap determination, ELNES) as well as for low kV TEM and STEM studies. With FEI's new STEM imaging technique iDPC (integrated Differential Phase Contrast), low Z and high Z atoms can be imaged together with very high S/N ratio, at one defocus value and without any contrast reversal. Moreover, iDPC with having high S/N ratio makes this technique an ideal imaging method for low dose STEM studies on beam sensitive specimens (2D materials, zeolites, etc.). In terms of EDS portfolio, Themis Z can be equipped with either Super-X or new Dual-X system for high sensitivity and high output EDS studies. With FEI's NanoEx in-situ holders, Themis Z itself becomes a well-equipped nano-laboratory, and FEI Ceta camera with speed upgrade provides high resolution 4k x 4k imaging with a speed of more than 30 fps, therefore all transformations during dynamic experiments are recorded without any missing information. Extra focus will be put on pixelated detectors and 4D STEM applications, while UHR EELS will show some good surprises…"