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Towards an FE-SEM as a complete analytical laboratory

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With ongoing miniaturization and optimization of materials, high resolution imaging becomes of increasing importance. The latest generation of FE-SEMs now have taken a significant evolutionary step towards the improvement of resolution possibilities, but high resolution is only beneficial if it is combined with additional improvement of analytical capabilities. This is extremely important for a lot of applications in material analysis where high resolution imaging is not sufficient for detailed sample investigations that have to cover more analytical aspects.

This presentation shows the latest improvements of Carl Zeiss NTS FE-SEM technology featuring increased resolution performance with never before seen detection possibilities.

The new FE-SEM systems of Carl Zeiss NTS are designed for a wide range of applications offering all kinds of information including imaging of material contrast and visualization of crystal orientation by utilizing a complete set of detectors. Due to new electronics, multi-channel mixing of all detector signals is possible, resulting in a final image with maximum information content. With additional integration of a charge compensation system these investigations are not restricted to conductive samples but can also be executed for all kind of nonconductive samples without encountering skirt effect issues, e.g. significant deterioration of image quality and reduction of resolution. The latest generation of Carl Zeiss NTS FE-SEMs is designed not only for maximum versatility, including low loss BSE imaging at low acceleration voltages but also for increasing the performance at high current conditions which can significantly reduce time for analytics such as WDX and EDX. Possibilities for in-situ mitigation of contamination make investigations even more time-effective and efficient avoiding prolonged preparation time of specimen contaminated prior to loading.

In this presentation comparative examples are shown to explain the different information content offered by the various available detector technologies. A special focus is the combination of material, topographical and channelling contrast with high current analytics such as EDX and WDX as well as the benefit of charge compensation mitigating contamination.

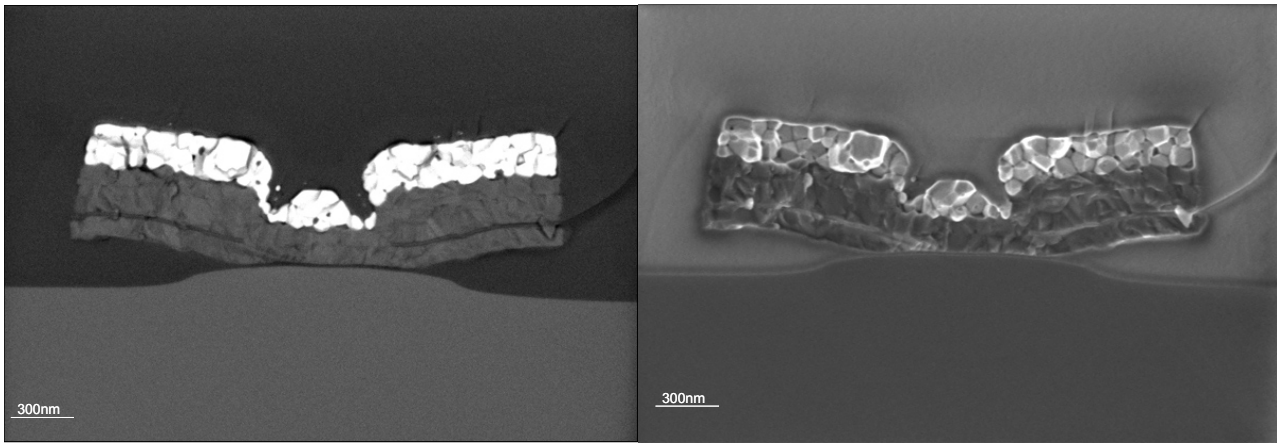

FIG. 1. Comparison of compositional (left) and topographical contrast (right) using in-lens energy filtered BS, and SE2 detection, respectively; micrographs taken at 35kX Magnification

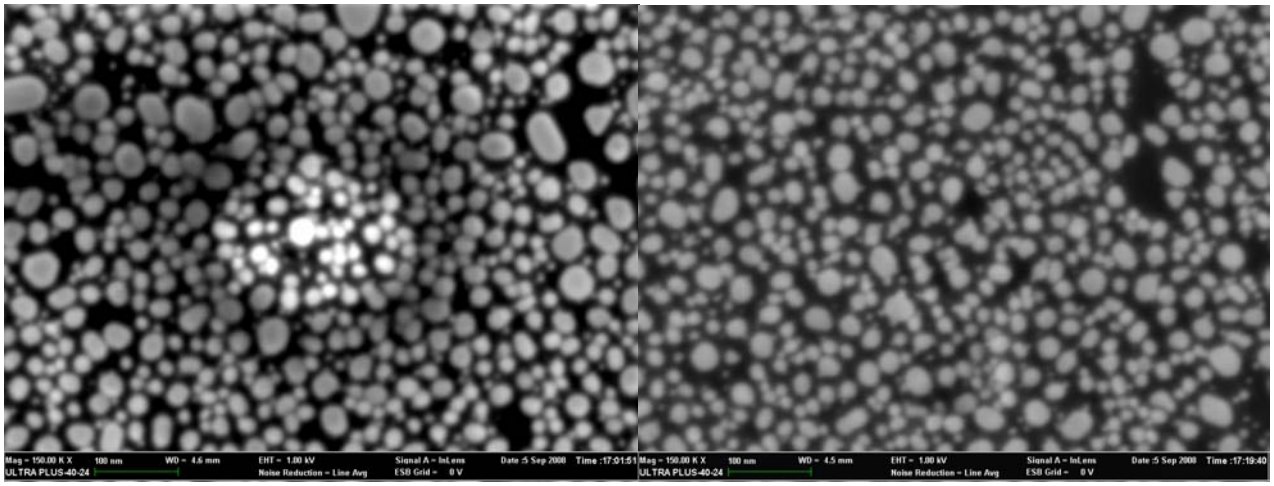

FIG. 2. In-situ mitigation of contamination: O_2 significantly removes contamination while imaging: (images aquired at 150 kX mag after 1min scanning at 600kX, EHT 1kV, Scan Speed 3), left micrograph: gold on carbon sample, deliberately contaminated prior to loading, image acquired without oxygen flow, right micrograph: image of same sample acquired with O_2 flow

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