[MS16-02] Combining X-rays and electrons to characterise disordered inorganic materials.

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Real space imaging by electron microscopy is invaluable in understanding the nature of planar faults or intergrowths and in quantifying the frequency of faulting. This information can be used to inform models for simulation and matching with powder X-ray diffraction data when the atomic structure of the components is known. In other cases where the faulting is with high frequency, space group information can be derived for a (hypothetical) structure with no faulting as an aid to structure solution. The former situation will be illustrated with respect to zeolite NU-85 and the latter with respect to zeolite NU-86. Now with the advent of aberration-corrected STEM issues relating to point defects or chemical inhomogeneity can also be addressed with real space data. This is made possible by atomic (column) scale spectroscopy – either Electron Energy-Loss Spectroscopy (EELS) or Energy-Dispersive X-ray spectroscopy (EDX) – exploiting the sub 100pm electron probe sizes that can be formed with high current density. This makes it possible to determine the distribution of scatterers of adjacent atomic number that can occupy a particular crystallographic site, atomic column by atomic column. Some complex ceramic oxide materials will be used as examples to illustrate the progress in this aspect.