

# Ongoing TKD developments

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Since the introduction of Transmission Kikuchi Diffraction, less than a decade ago, our research has focused on exploring the usefulness of the technique in the characterization of nanocrystalline materials in the scanning electron microscope. Several challenges emerged from early investigations: keeping charging under control, reducing drift and avoiding sample contamination were the most common difficulties encountered. A particular challenge we faced, which underpinned our following research efforts, was how to combine high resolution STEM images with the TKD orientation measurements during dynamic experiments. While the optimized geometry and the increased signal yield of the on-axis TKD detector provides a favourable platform for time resolved experiments, the integrated imaging system being located outside the detector screen prevents the acquisition of optimal simultaneous STEM and TKD signals. To eliminate this drawback, we have added a new bright field imaging capability at the centre of the on-axis TKD detector, thus enabling simultaneous acquisition of optimal quality STEM-BF images and orientation maps without detector movement.

In this presentation the development of this new detector configuration (shown in Fig. 1a-d), its advantages and limitations will be presented. Furthermore, challenges in characterizing nanoparticles discussed and some on-going TKD developments will be presented.

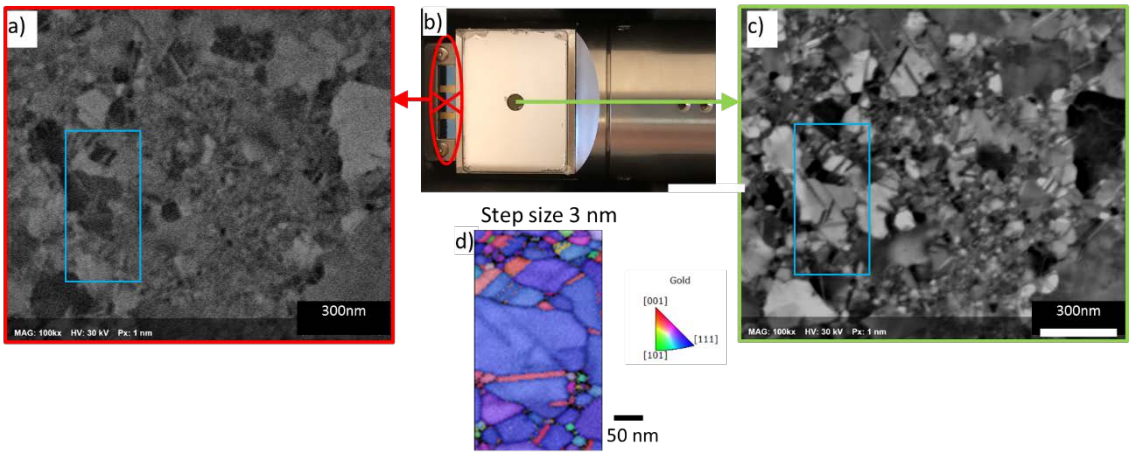


*Figure1: STEM images and TKD measurements obtained with the new detector configuration without detector movement. a) STEM-DF image, b) Prototype detector indicating which diodes are used for each image, c) STEM-BF image d) inverse pole figure overlaid with the pattern quality map of the out of plane direction.*