In Situ Environmental TEM Observations of Active and Inactive Catalyst Nanoparticles

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Abstract Body:

Structure, composition and morphology are some of the major factors that affect the activity of catalyst nanoparticles. Generally a catalyst sample contains both active and inactive nanoparticles. We need to characterize these particles under reaction conditions to differentiate between the two types of particles. Application of in situ dynamic imaging and nano-spectroscopy, using an environmental TEM, to differentiate between the structure and composition of active and inactive nanoparticles will be illustrated using two examples. First, I will describe the role of nanoscale compositional heterogeneity, as determined using electron energy-loss spectroscopy (EELS), in zirconia doped ceria on its redox properties. Second, I will elucidate the structural differences between the Fe nanoparticles that are active for the nucleation and growth of carbon nanotubes (CNTs).