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X-ray absorption spectroscopy as a direct probe of nanoparticle morphology ADAM MCCLURE, KEITH GILMORE, DAMON RESNICK, ALEX LUSSIER, YVES IDZERDA, Department of Physics, Montana State University, MICHAEL KLEM, JESSIE MOSOLF, MARK ALLEN, TREVOR DOUGLAS, Department of Chemistry, Montana State University, MARK YOUNG, Department of Plant Sciences, Montana State University — When properties of nanoparticles are found to vary from expected bulk values it is uncertain whether this is the result of a mixed-phase or amorphous product, or an observation of a true intrinsic size or surface effect. We present x-ray absorption spectroscopy (XAS) as an ideal tool for answering this technologically important and academically interesting question. The strength of XAS lies in the fact that it is a direct element specific probe of electronic structure. We present XAS data on nanoparticles (4-20 nm diameter spheres) of gamma-Fe_2O_3, Co_3O_4, and TiO_2. The data reveals that gamma-Fe_2O_3 may be grown in the pure phase down to at least 4 nm, while TiO_2 shows intrinsic size effects at around 10 nm. Our Co_3O_4 data presents an example of a mixed phase system.

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