# Detecting and characterizing engineered nanomaterials: a key tool for environmentally responsible nanotechnology

Edward M. Heithmar, U.S. Environmental Protection Agency, Office of Research and Development, National Exposure Research Laboratory

The same properties of engineered nanomaterials (ENMs) that are the basis for their many novel applications also raise important issues related to their environmental impact. ENMs might not behave similarly in the environment to the dissolved or solid forms of the chemicals from which they are manufactured. The novel reactions that ENMs can facilitate might also lead to previously unknown mechanisms adverse effect. Many ENMs will be released to the environment in substantial quantities as their use grows. Uncertainties related to these issues, along with an increasingly precautionary societal approach to new technology, have fueled a tremendous expansion in research into the various aspects of the environmental, health, and safety (EUS) of ENMs.

This presentation will discuss some of the EUS science questions related to ENMs. It will introduce a qualitative risk model that the U.S. Environmental Protection Agency and others use to organize EHS research. The central role of metrology tools in all types of EHS research related to ENMs will be discussed, as well as the unique challenges these materials pose in developing these tools. A review of current approaches to detecting and characterizing ENMs will be provided, discussing the strengths and limitations of each. A new metrology tool, single particle inductively coupled plasma mass spectrometry will be described, and initial applications of the method will be presented. Finally, likely future directions in metrology methods development for ENMs will be discussed.