

## **Detection and Characterization of Natural and Engineered Nanoparticles in the Environment**

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**Abstract.** In the last twenty years, we have witnessed an explosion in the manufacture of nanoparticles (diameters smaller than  $10^{-7}$  meter) for medical and engineering applications. Some of the characteristics most prized in these applications, such as catalytic capability, are the very same that make engineered nanoparticles a potential environmental hazard. While the impact of nanotechnology has increased, successful efforts at efficiently characterizing the output of this nascent industry for environmental, toxicological, and hydrological studies have not kept up. Application of traditional methods, such as electron microscopy and UV spectroscopy, are not feasible for environmental samples due to the significant dilution and the complex matrices that can be encountered. These matrices may include an abundance of natural nanoparticles. Inductively coupled plasma (ICP)- mass spectrometry and ICP- optical emission spectrometry are powerful detectors for inorganic nanoparticles that might overcome these detection and discrimination obstacles. Furthermore, in conjunction with separation techniques, ICP-MS and ICP-OES can be used to characterize the size distribution, metal concentrations, and stability of inorganic nanoparticles. We will present the results of these characterization approaches, and discuss hydrological implications.