Quantifying Nanoparticles: A Comparison of North American and European River Basins

In order to assess the environmental risk of released engineered nanoparticles, we must be able to detect them in complex environmental samples and distinguish them from naturally occurring nanoparticles, which are widespread as a weathering product of minerals. This poses an analytical challenge which could be addressed using single particle inductively coupled plasma-mass spectrometry (spICP-MS), a technique that has recently revolutionized nanoparticle analysis. spICP-MS provides element specific particle number concentrations and particle size distributions in samples with low particle concentrations. High resolution spICP-MS instruments have been developed with very low size detection limits and higher resolving power for elements with interferences. This improves the sensitivity of the technique and its applicability to complex samples. This new analytical tool has great potential to overcome the current challenges in environmental nanoparticle analysis, but it has not yet been applied to natural systems.

During my Fulbright research study at Institut de Physique du Globe de Paris, I will examine the natural nanoparticle content of European and North American river waters using high resolution spICP-MS. The project will advance the analytical capabilities of spICP-MS instrumentation, establish background levels and characterization of natural nanoparticles in a variety of water systems, and greatly improve our ability to detect anthropogenic inputs of released engineered nanoparticles. The Fulbright fellowship is more than an opportunity to conduct innovative research, however. This international collaboration will contribute toward shared understanding and ideas between our countries and I am honored to serve as a student ambassador for the U.S. during my stay in France.