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## EMERGING MATERIALS AND NANOTECHNOLOGY

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**Quantifying the biological fate of nanosilver****David Kennedy**

National Research Council of Canada, Canada

With a growing number of high precision tools for studying biological systems, it is important to develop traceable quantitative methods that result in accurate measurements. Because biological systems are both complex and fluxional, context is vitally important for such measurements in order for them to be accurate. Correlation of measurements through space and time can provide such quantitative assessments. Metallic nanoparticles pose many challenges for measurement in cellular systems. The metal can interfere with the detection method and the particles can change in size and shape over time and in association with different biological molecules. At the National Research Council, we seek to correlate detailed physical characterization of silver nanoparticles with biological measurements to generate methods for measuring the impact of nanosilver on different cell types and quantifying the specific interactions of nanosilver with biological molecules. Correlating changes in nanoparticles over time in biological fluids helps to provide an understanding of nanoparticle behaviour and results in higher reproducibility of observed biological endpoints. Surface coatings play a pivotal role in recognition of the particles by cellular receptors suggesting active transport plays a critical role in the nanosilver life cycle. Physical and chemical differences between silver nanoparticles and changes that occur in biological test media can be correlated to toxicity, and different mechanisms for toxicity are apparent. Uptake rates and localization is also different between different cell lines. Uptake and localization of particles provides evidence that nanosilver should not be treated as a single material but should be studied as an array of materials with different properties in different biological systems.

**Biography**

David Kennedy is an expert in Biological Inorganic Chemistry with nearly a decade of experience working at the nano-bio interface. He currently works in the areas of nano- and bio-metrology at the National Research Council Canada. Previously, he has also held posts in Chemical Biology, Molecular Imaging and Nanomedicine both at the NRC and MPI in Berlin, Germany. Currently, he is focused on building new tools for standardizing measurements of nanomaterials in biological systems. This also includes the use of new nanobiomaterials used to mimic living tissues. Research in his lab also partners across several other government organizations including Health Canada, Environment Canada and the Canadian Food Inspection Agency, as well as several different parts of the NRC.

David.Kennedy@nrc-cnrc.gc.ca

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