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Nanoparticle Surface Activity: Understanding, Measuring and Integrating it into Inhalation Dosimetry

Wednesday, 11 March 2015 17:00 (30 minutes)

This presentation will analyze the pitfalls of current nanoparticle exposure metrics for health effects studies using real-world exposure scenarios. Through case studies and literature review, the talk will emphasize the critical and, at present, unmet need for more selectivity in the chemical characterization of airborne nano aerosols, and exploration of the concept of dose that integrates surface area and surface activity. Different principles employed in measuring surface activity—offline and online—including Reactive Oxygen Species (ROS) generation, will be summarized and compared. Several commonly used methods for ROS and surface activity measurements of engineered nanomaterials (ENM), such as the Ferric Reducing Ability of Serum Assay (FRAS), dichlorofluorescein (DCFH) assay, dithiothreitol (DTT) and electron spin resonance (ESR) will be compared for diverse engineered nanomaterial (ENM) classes. The within- and between-class variations in surface activity for various classes of nanomaterials will be summarized. Validation of these measures against inflammatory responses in vitro and in vivo will also be discussed. The presentation will conclude with a summary of performance requirements that need to be taken into consideration for a workable personal monitor for surface activity and surface area measurements and compare those to the first generation prototypes of near real-time monitors for surface activity.

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