Toxic Potential of Engineered Nanomaterials

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About the lecture: Currently there are thousands of nanoproducts containing at least one type of engineered nanomaterials (ENMs) on the market and the number is increasing rapidly as more nanomaterials are being discovered and used in numerous applications. However, our understanding on their impact on environmental health and safety is still in its infancy. The new Toxic Substance Control Act (TSCA) that came into effect in 2016 requires toxicity testing for all chemicals including ENMs. Considering the large number of ENMs with different physicochemical properties, it is imperative to develop a rational approach to investigate the potential adverse effects of ENMs. We developed a predictive toxicological approach that utilizes mechanism-based in vitro high-throughput screening (HTS) to understand the toxicity mechanism of ENMs, which is used to make predictions on the adverse outcomes in vivo. This allows rapid screening of large number of ENMs and building of structure-activity relationships for nanomaterial safety assessment. The knowledge of the information could be used for safer design of ENMs that facilitate sustainable development of Nanotechnology.

About the speaker: Dr. Tian Xia is the Associate Adjunct Professor of Medicine in the Division of NanoMedicine, Department of Medicine at University of California, Los Angeles (UCLA). His main research area is on the environmental and health impacts of engineered nanomaterials with the goal to understand molecular mechanisms of toxicity that links the nanomaterial property to adverse effects. Predictive toxicology and high throughput screening are the main approaches for his research. He has studied toxicological profiles for over 100 different nanomaterials covering the major material categories including carbonaceous materials (fullerene, graphene, graphene oxide, carbon nanotubes (single,- multi-walled)), metal (Au, Ag) and metal oxides (transition metal oxide, rare earth oxide), silica, III -V materials. The findings on the nanostructure and activity relationships have been used for safer design of nanomaterials and development of environmental and biomedical applications. He has published over 120 articles and he was named Highly Cited Researcher in Chemistry in 2016 by Clarivate Analytics.

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