Characterization of airborne nanoparticles using a combination of in situ direct-reading and filter-based mass measurement strategies

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A combination of direct-reading instrumentation and filter-based mass measurement strategies were used for improved exposure characterization of airborne particles including nanoparticles (NPs) in the workplace. The integrated instrument suite consisted of a portable scanning mobility particle sizer (SMPS), a portable condensation particle sizer (CPC), an aerodynamic particle sizer (APS), a diffusion charger (DC), and aerosol mass monitors (Dust Trak), for in situ monitoring and characterization of particle number, mass and active surface area concentrations and size distributions. A micro-orifice uniform deposit impactor (nano MOUDI) in combination with Health Canada’s patented Archimedes M3™ buoyancy-corrected gravimetric analysis facility and an inductively coupled plasma-mass spectrometry (ICP-MS) were used for filter-based size fractionation, gravimetric analysis and determination of metal distribution. One of the most challenging tasks for accurate NP risk assessment and management was distinguishing background from process-related NP emissions, due to the wide temporal and spatial variability of background NPs.

Biography
Dr. Jianjun Niu is a senior research chemist at the Environmental Health Science and Research Bureau of Health Canada. He received his Ph.D from Changchun Institute of Applied Chemistry, Chinese Academy of Science and his postdoctoral research experience at both Max-Plunk Institute for Polymer Research, Germany and University of Ottawa, Canada. His current research mainly focuses on human exposures to particulate matter (PM) and metals in urban air and in household dust (HD), nanoparticles (NPs) characterization and exposure assessment, and metal bioaccessibility and speciation in PM, NPs and HD. He has published more than 80 papers in peer-reviewed journals and conference proceedings.

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