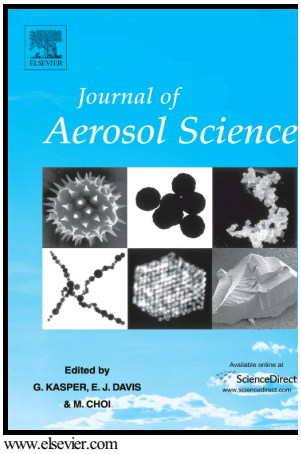

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Measurement of Transport Properties of Aerosolized Nanomaterials

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Abstract

Airborne engineered nanomaterials such as single-walled carbon nanotubes (SWCNTs), multi-walled carbon nanotubes (MWCNTs), functionalized MWCNT, graphene, fullerene, silver and gold nanorods were characterized using a tandem system of a differential mobility analyzer and an aerosol particle mass analyzer to obtain their airborne transport properties and understand their relationship to morphological characteristics. These nanomaterials were aerosolized using different generation methods such as electrospray, pneumatic atomization, and dry aerosolization techniques, and their airborne transport properties such as mobility and aerodynamic diameters, mass scaling exponent, dynamic shape factor, and effective density were obtained. Laboratory experiments were conducted to directly measure mobility diameter and mass of the airborne nanomaterials using tandem mobility-mass measurements. Mass scaling exponents, aerodynamic diameters, dynamic shape factors and effective densities of mobility-classified particles were obtained from particle mass and the mobility diameter. Microscopy analysis using Transmission Electron Microscopy (TEM) was performed to obtain morphological descriptors such as envelop diameter, open area, aspect ratio, and projected area diameter. The morphological information from the TEM was compared with measured aerodynamic and mobility diameters of the particles. The results showed