Materials Science-2013

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Materials Science & Engineering

October 7-9, 2013 Hampton Inn Tropicana, Las Vegas, USA

Aerosols handbook: Measurement, Dosimetry, and health effects

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Abstract

Aerosols consist of particles in the very broad range of sizes from nanometers to hundreds of micrometers (4 o 5 orders of magnitude). Therefore, their behavior is complicated in the atmosphere, indoor and especially in the lung. Health effect associated with aerosols depend on the physical parameter that we call “dose”. Dose depends on the quality of aerosols in target sells. With the exception of some radioactive aerosols, it is practically impossible to measure dose directly. In practice, assessment of the dose is provided by measuring air concentration and calculating some known parameters. During the past years, nanotechnology industries have grown rapidly with federal and state initiatives, and these promise substantial economic benefits. Aerosols can effect both global climate and, when inhaled, human health. The USEPA assessment of benefits to human health Clean Air Act attributed 90% of the estimated benefits to reduction in particular matter during 1900-2100. The human effects associated with aerosols depend on local deposition of the particles in lung. Radioactive aerosols are of interest because their deposition in the lung can be determined in order to to estimate radiation dose and subsequent health effects. New chapters are included in the second edition that deal with inmportent practical problems: nnoparticle cell penetration, high aspect ratio nanomaterials, aerosols and climate change, health effect of metals in air, and thev unattached fraction of sof aerosol progeny as a tool for nanoparticles. Other chapters in this edition update the area of aerosol physics, medical and pharmaceutical aerosols, health effect of ultrafine particles, radon epidemiology, long-lived radionuclides in the atmosphere, and lung deposition mechanisms.