8HA.10

Toxicological and Chemical Properties of Fine Particles Produced from Various Sources. MINHAN PARK, HungSoo Joo, Kwangyul Lee, Tsatsral Batmunkh, Lucille Joanna Borlaza, Heung-Bin Lim, Han-Jae Shin, Myoseon Jang, Ji Yi Lee, Min-Suk Bae, Kyu-Hyuck Chung, Daeun Kim, Kihong Park, *Gwangju Institute of Science and Technology*

Fine particles in the ambient atmosphere are a complex mixture of various chemical components. Determination of source-specific toxicity can be an useful way to disentangle effects of PM on human health. The goal of this study is to assess variability in toxicity of particles produced from various sources, diesel and gasoline engine, biomass burning, coal burning, and dust, including secondary organic aerosols. Physical and chemical characterization of aerosols was conducted to relate source-specific toxicity of aerosols to their chemical components. In addition, ambient PM samples collected from urban, rural, roadside, and industrial areas were analyzed for determination of their chemical composition and toxicity. Chemical characteristics such as ion, metal, organic carbon (OC)/elemental carbon (EC) was determined by ion chromatography (IC), inductively coupled plasma mass spectrometry (ICP-MS), and thermal-optical transmittance (TOT) method, respectively. OC speciation was conducted by gas chromatography-mass spectrometry (GC-MS). Toxicity test was conducted using chemical and biological assays. For chemical assay, oxidative potential (OP) was measured by OPDTT and OPESR. For biological assay, various end points, cytotoxicity, mutagenicity, oxidative stress, and inflammation, were determined by neutral red uptake (NRU) assay and water soluble tetrazolium salt (WST-1), Ames test and comet assay, DCF-DA (2',7'-dichlorofluorescein diacetate) assay, IL-6 and IL-8, respectively. A statistical analysis was applied to relate chemical and toxicity of various aerosols. Preliminary results show the rankings of source-specific risks based on the results obtained up to the present can be suggested; 1) Primary aerosols from various sources: DEP > biomass burning particles > coal burning particles (550°C) > Tunnel dust, 2) Secondary organic aerosols: Toluene SOA > Isoprene SOA > TMB SOA > α-pinene SOA, and 3) Ambient aerosols (PM2.5): Roadside > Industrial > Urban > Rural site.

8HA.11

Study on a Commercial Nasal Filter Against Environmental Tobacco Smoke Particulates. JINTUO ZHU, Xinjian He, Steve Guffey, *West Virginia University, Morgantown, WV*

Introduction: Environmental Tobacco Smoke (ETS) is associated with various respiratory diseases. People who live with smokers or work in restaurants, bars, casinos are long-term exposed to ETS. Wearing filtering facepiece respirators (FFRs) may be not feasible for cosmetic and comfortable reasons. Commercially available nasal filters may be a practical alternative for daily use as people breath 90% of air through the nose. However, there is limited research available on the filtration efficiency of nasal filters against ETS smoke particulates.

Methods: A nasal filter testing system was designed. Mainstream smoke (smoke filtered by the cigarette filter) and sidestream smoke (spontaneous combustion smoke) were generated and measured by a TSI NanoScan SMPS (10-420nm, 13 channels) and a CPC (10-1000nm), respectively. Three constant flows (15, 30, and 50 L/min) and three cyclic breathing flows (mean inspiratory flow, MIF = 15, 30, and 50 L/min) were tested. The concentrations of downstream (C_{down}) and upstream of the tested nasal filter (C_{up}) were measured; particle penetration (P) was determined as Cdown/Cup. The total number of runs is 96 (2 smoke aerosols×2 measurement devices×2 flow types×3 flow rates×4 replicates).

Results: The results reported by SMPS and CPC agreed with each other. It was found that the tested nasal filter had limited effectiveness against ETS with almost all penetration values > 50%. The SMPS results showed that as the particle size increased, the penetration decreased. Duncan's grouping showed that the penetration of sidestream smoke was significantly higher than mainstream smoke, while the penetration under cyclic flow was significantly higher than constant flow. Surprisingly, regardless of the smoke pattern and flow type, as the flow rate increased, the penetration value decreased.