growth when detected in active building HVAC systems. The high cost of HVAC system cleaning or replacement, and the disruption of building activities, rendered mold removal an unacceptable option for addressing the mold problem in this building. Because the presence of the *C. sphaerospermum* had not adversely impacted the indoor air quality of the building, the building owners elected to manage the problem by implementing a year-long air monitoring program using polymerized chain reaction analyses as the primary method for detecting and quantifying the presence of mold growth in the building air.
Results: Twelve months (calendar year 2012) of comprehensive air monitoring of each floor of the building will be presented to demonstrate the effect of HVAC *C. sphaerospermum* on the building indoor air quality. After eight months of air monitoring, the presence of *C. sphaerospermum* in the building HVAC system has had no adverse impact on the indoor air quality of the building.
Lessons Learned: Despite current industrial hygiene literature recommending the removal of mold growth when detected in active building HVAC systems, our data suggests that from a risk perspective, building owners may be able to manage the presence of mold growth in their building HVAC systems in ways similar to how industrial hygiene traditionally manages other hazardous materials in the workplace, such as asbestos and lead-based paint.

Nanotechnology

Monday, May 20, 2013, 10:00 AM – 12:00 PM

SR-401-19
Nanoparticle Exposures in Three Research Laboratories of Québec

M. Debia, S. Weichenthal, A. Dufresne, Université de Montréal, Montreal, QC, Canada.
Objective: Research efforts to develop and advance nanoparticles (NPs) have been increasing rapidly. Since several questions remain with respect to the toxicity of these particles it is important to understand potential occupational exposures. In general, devices used to assess NP exposures are expensive and are not designed for personal sampling; however, condensation particle counters (CPC) are simple devices that may provide important real-time information with respect to important sources of occupational NP exposures.The objective of this work is to assess NP exposures in three research laboratories using CPC (p-trak 8525, TSI).
Methods: Exposure monitoring was conducted in three NP laboratories: 1) aluminium/copper NP production using cryomilling technique, 2) nanocomposite research facility using dry Multiwalled Carbon Nanotubes (MWCNTs) in a plastic extrusion machine, 3) nanocomposite research laboratory using dry MWCNTs and plastic machining operations (cutting, polishing).
Results: NP releases were identified in two of the three laboratories. In the first laboratory, concentration peaks were identified each hour when the student took a sample of powder in the mill. Each concentration peak was on average two times greater than the particle background level. NP releases were also identified during cleaning operations. In the second laboratory, no NP release was identified. In the third laboratory, NP releases were identified only during polishing operation.
Conclusions: CPC are useful tools for identifying real-time NP releases and can be easily used in the worker breathing zone. However, the limit of detection of the CPC and the presence of high background level of particles were identified as limiting factors when using CPC. Overall, CPCs may be useful tools for industrial hygienists in performing initial exposure assessments in NP facilities.

SR-401-17
Characterization of Airborne Nanoparticles Using Four Different Methods

M. Henderson, Y. Hammad, University of South Florida, Tampa, FL.
Objective: The purpose of this research was to assess the effectiveness of current nanoparticle aerosol measurement methods including Condensation Particle Counter (CPC), Optical Particle Counter (OPC), and Scanning Mobility Particle Sizer (SMPS), that

is, real-time instruments used in evaluating properties of nanoparticle aerosol clouds; and compare the resulting concentrations and size distributions to these obtained by electron microscopy (EM).

Methods: Sodium chloride nanoaerosols were generated using a Collison Nebulizer. The aerosol cloud was passed through a radioactive neutralizer and a diffusion dryer prior to entry into the test chamber. The chamber was evaluated for air leakage, relative humidity, air flow patterns, and dispersion patterns. Real-time measurements were obtained with the OPC, CPC, and SMPS. Air samples were also collected on membrane filters for EM analysis.

Results: The CPC was stable and consistent but the results were limited to nanoparticle concentration. The SMPS was effective in measuring the concentration and size distribution of the nanoparticle cloud. Comparable concentrations of nanoparticles within the size range of 20nm to 200nm, with a median diameter range of 80nm to 100nm were observed as determined by the SMPS and EM. The SMPS and EM sample results were comparable. The OPC provided particle concentrations in selected nanoparticle size ranges but did not perform well at elevated nanoparticle aerosol concentrations.

Conclusions: Based on the information obtained from our research, the direct reading instruments examined in this study should be used with caution for characterization of size and concentrations of a nanoparticle cloud. Electron microscopy should be used to verify size and concentration reported by the instruments.

SR-401-20

Nanoparticle Leakage through Staple Punctures in N95 Single Use Filtering Facepiece Respirators

D. Medina, Y. Hammad, University of South Florida, Tampa, FL.

Objective: NIOSH-approved N95 filtering facepiece respirators (FFPR) are widely used in industry where personnel are exposed to aerosolized particles that can produce adverse health effects. The manufacturing processes for some N95 FFPR attach the head straps by stapling them directly onto to the respirator filter. This method punctures the filter media and creates an open space between the staple and the filter where leakage of particles can occur. This study evaluates the effect of stapled head straps on respirator efficiency using 5 different N95 FFPR models challenged with 30 to 500 nm polystyrene latex spheres when the stapled head straps are left intact, stretched, and the staple punctures sealed.

Methods: A polystyrene latex aerosol is generated by a 3-jet Collison nebulizer operating at 20 psi. The aerosol cloud is dried and charge neutralized using a silica gel desiccant and a radioactive beta source (Kr85). The aerosol is introduced and mixed in the top part of the testing chamber above the respirator test assembly. A Scanning Mobility Particle Sizer is used to measure particle concentration inside and outside the respirator test assembly and this ratio is used to determine respirator efficiency.

Results: N95 FFPR efficiencies differed by model, particle size, and staple condition. There is significant difference between different models of FFPR and among the efficiencies of a single model when the head straps are left intact, stretched, and when the staple puncture is sealed. The lowest efficiencies were observed when head straps were stretched and at the 50–60 nm particle sizes. For some FFPRs, efficiencies were below 95%.

Conclusions: The study suggests that nanoparticle concentrations inside N95 FFPRs with stapled head straps (attached to the filter media) are expected to be higher than models with head straps attached using a method that does not puncture the filter.

CS-401-18

Emerging Issues Associated With the Use of Nanomaterials In Formulation and Use of Consumer Products: An Information Sharing Opportunity for the Nanotechnology Working Group

S. Maberti, ExxonMobil, Houston, TX.

Participation in the AIHA® Nanotechnology Working Group (NTWG) can provide opportunities for sharing information about

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ABSTRACTS

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