2IM.5
Characterizing Metal Particles Emitted from Aircraft Engines.
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The volatile and non-volatile particles emitted from aircraft engines have been an area of intensive research. For the non-volatile particles, this component has been typically associated with soot/black carbon. Metals could possibly be another component of the non-volatile particles; however, these metals have not been as well characterized during aircraft emission studies. Characterization of what types of metal particles are emitted from aircraft engines due to regular operations and wear and tear is needed to help evaluate their air quality impact near airports. Here, we use a combination of in-situ (soot particle high-resolution time-of-flight aerosol mass spectrometer) and off-line (transmission electron microscopy and other microscopy techniques) to characterize the metal particles directly emitted from aircraft engines without the influence of metal particle emissions associated with take-off and landing (e.g., tire wear and brakes). These observations will span different aircraft engine studies to potentially differentiate different metal particles from different engines and/or engine operating conditions. Initial analysis of the in-situ observations indicate the potential importance of titanium, iron, and potentially zinc emissions from aircraft engine operations.

2IM.6
Exposure to Crystalline Silica Nanoparticles during Fabrication of Natural and Engineered Stones.
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Inhalation exposure to airborne respirable crystalline silica (RCS) during the fabrication of construction products such as engineered and natural stone-based kitchen countertops has been on the rise globally in recent years. The disease burden from RCS exposure is well documented; however, little is known about the abundance of crystalline form of silica in the nanoparticle or sub-100 nm fraction and its implication on health effects. The nanoparticles have longer settling times, higher surface area per unit mass, greater probability of depositing in the alveolar region and can present greater health risks if they are abundant in the RCS fraction. In this study, we report on the fractional silica content in the sub-100 nm and respirable aerosol during grinding/cutting/drilling of natural and engineered stones in laboratory wind tunnel experiments. The crystalline silica content was determined through X-ray diffraction (XRD) and Raman spectroscopic analysis. The presence of the crystalline phase of silica in the sub-100 nm fraction was further confirmed by electron diffraction analysis in transmission electron micrographs. For the aerosol generated during the grinding of a commercial engineered stone, the sub-100 nm fraction accounted for 0.5 % of the aerosol mass, whereas it accounted for 27 % of the aerosol surface area based on total lung deposition. To better understand exposure, the relative amount of silica in the respirable and sub-100 nm compared to the bulk crystalline silica fraction in the stones during different fabrication processes will be presented. The efficacy of nanoparticle removal by simple engineering controls during fabrication will be discussed.