Environmental Aerosol Research at Oak Ridge National Laboratory

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ABSTRACT

Aerosol science and technology is a young discipline of academic study.It requires knowledge from physics, chemistry, biology, and engineering, for example. Aerosols are small solids or liquid particles suspended in the air with the size ranging from sub-nanometers of molecular clusters to tens of micrometers of ambient dusts. Airborne particles are ubiquitous and can have profound impacts on the environmentbecause of its remarkable physical and chemical properties. Commonly known ambient aerosol particles are like PM_{10} and $PM_{2.5}$ that are emitted from many sources or produced through a complex web of atmospheric reactions. There are also particles produced by liquid fuel combustion processes such as internal combustion engines of ground vehicles and aircrafts that are difficult to sample and analyze. Furthermore, unique small particles have also been made through nanotechnology, for example, which could exhibit useful physical, chemical, as well as biological properties. Some of these properties may have adverse impacts to human health because of their strong affinity to genetic materials and excessive mobility within the human body. Studying the fundamental properties and behavior of small particles suspended in the air (i.e., aerosols) has become a major research discipline at the Oak Ridge National Laboratory (ORNL) in the United States. We have applied expertise in aerosol science and technology to address many issues discussed above. In environmental aerosol research, airborne particles have specificimplications from not only environmental pollution but human health and from not just visibility degradation but climate change, for example. I will share someof these workswe have performed at ORNL using a few examples from prior projects. I will alsouse these examplesduring my presentation to entice the interests of students and colleagues at 交通大學 in aerosol science and technology.