Proceedings of 7th International Conference of Recent Trends in Environmental Science and Engineering (RTESE'23)
Canada – June 04-06, 2023
DOI: 10.11159/rtese23.002

On The Importance of Airborne Nano-Size Particles: Air Quality, Health, Sustainability, and Climate Change

Professor Parisa A. Ariya
Department of Chemistry and Department of Atmospheric and Oceanic Sciences
McGill University, Montreal, QC, Canada

Abstract

Particles, nano, micro and macro-particles, are ubiquitous on Earth. They are chemically, physically, and biologically diverse. They are naturally produced or increasingly through numerous anthropogenic activities, namely medicine-health, chemical industries, materials, construction, transport, communication, aerospace, agriculture, and energy sectors. Air pollution, particularly airborne nano-size particles, is identified as the cause of ~ six million people per year worldwide (WHO, 2020). Aerosols are also significant in climate change and Earth's energy processes. They play a role in radiation, ice nucleation and precipitation events (IPCC, 2018). The identified gap of knowledge by both the IPCC and the WHO are converging, and it becomes clear that they are related to the physicochemical characteristics of particles. Air and water are in motion, as are the particles in air and water. We should be able to observe, track, characterize and remediate in-situ and real-time in 4D (3 dimensions and time). In this talk, we provide an overview of the recent advances in this lab to help to fill the gap identified by the IPCC and the WHO in the age of climate change and COVID-19. We discuss the development of novel promising technologies for fast in-situ and real-time observation of aerosols and waterborne viruses and physicochemical transformations and ice nucleation of anthropogenic emerging nanoparticles (e.g., nano-plastics in air/water). We explore some links between fundamental studies that provide advances in designing zero-net energy and recyclable technology using natural particles in air and soil to remove gaseous and particulate matter in the hydrosphere, cryosphere, and atmosphere.