



# Mechanical Engineering Colloquium

October 20th, 2015

Macdonald Engineering Building (MD) 267 from 11:00am-12:00pm

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## **Abstract:**

Aerosols are two phase systems including liquid and/or solid particles dispersed in a gas. The behavior of particles in an aerosol depends on their physical properties (e.g. size, shape, etc) and their chemical properties (e.g. chemical composition, volatility, etc). Combustion engines are one of the major sources of particle emissions in urban areas. Combustion generated soot is typically composed of primary particles which are approximately spherical and form aggregates by coagulation. In addition to solid particles, combustion engines also emit semi-volatile material. Semi-volatile compounds are organic compounds which can vaporize at temperatures above room temperature. Hydrocarbons and sulfuric acid are the main source of semi-volatile material from vehicles.

Nanoparticle aerosols in the atmosphere can have a significant effect on climate by scattering and absorbing solar radiation. Highly absorbing particles, like those composed of black carbon (BC), can absorb and re-emit solar radiation causing a net heating effect. There are a number of commercially available mass measurement instruments that are used to measure the BC concentration from different sources such as engines and burners in real-time. However, the effect of the physical and chemical properties of the particles on mass concentrations measured by different instruments is not fully understood yet. In this presentation, the influence of particle properties on relative response of several mass measurement techniques including photo acoustic spectroscopy (PAS), laser induced incandescence (LII), and cavity extinction with total scattering (Ex-Sc) will be discussed.

## **Biography:**

Dr. Ali Momenimovahed is a Research Associate in Measurement Science and Standards at National Research Council, Canada. Over the past several years, Dr. Momeni focused on studying the physical, chemical and optical properties of the particle emissions from different sources including vehicles and engines, gas turbines and lab flames using a variety of measurement techniques including mechanical and optical methods. Dr. Momeni is interested in modern techniques for measuring the mass concentration of black carbon and the effect of particle properties on the mass concentrations measured by different measurement methods.