# 3A3) (특강) Combustion Generated Fine Particles, Trace Metal Speciation, and Health Effects

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**Abstract**

Combustion generated fine particles, defined as those with aerodynamic diameters less than 2.5 m, have come under increased regulatory scrutiny because of suspected links to adverse human health effects. Transition metals are of particular interest due to the results of a number of studies that have shown cardiopulmonary damage associated with exposure to these elements and their presence in coal, residual fuel oils, sewage sludge, and other combusted fuels and wastes. This lecture will review results from multi-disciplinary studies being conducted at EPA and elsewhere examining the physical, chemical, and toxicological characteristics of combustion generated particles. The research describes how collaborative work between combustion engineers and health scientists can provide insight on how combustion processes affect particle properties and subsequent health effects as measured by a combination of in-vitro and in-vivo studies using a variety of animal models. The focus of this lecture is on the interdisciplinary approach required to address the problem. Difficulties are discussed. Engineering aspects involved in this approach are described in detail. Physical and chemical characterizations are performed using a variety of analytical approaches including new techniques of x-ray absorption fine structure (XAFS) spectroscopy and x-ray absorption near-edge structure (XANES) deconvolution of these spectra to gather metal speciation information.

**Outline of the presentation**

- Regulatory History
- Epidemiology Background (3 studies)
- Contribution of Combustion Generated Primary PM
- Experimental Approach
- Residual Fuel Oil
- Pulverized Coal
- Diesel
- Acknowledgements

**Scope of the presentation**

- Focus is on primary PM from residual oil and coal combustion
  - Tratansition metals
  - Rele physical and chemical characteristics to health effects
- Recent efforts include diesel PM
- Establish value of collaboration between combustion engineers and health scientists
- Interested in identifying PM properties causing health effects
  - Mechanisms
- Introduce the idea of health effects engineering
  - Altering PM toxicity by combustion modifications