Chemical Imaging Analysis of Environmental Particles

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Purpose

Development of a unique analytical platform for comprehensive analysis of gas-particle reacting systems

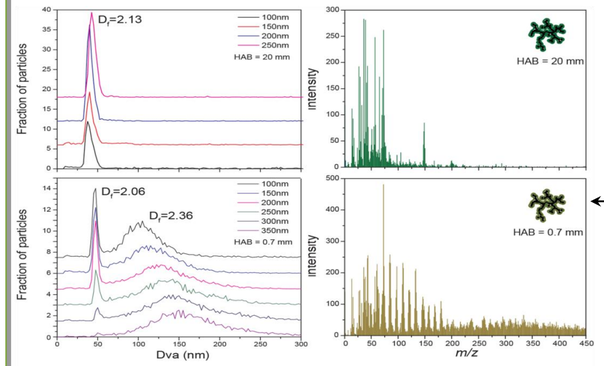
Fundamental understanding of particle chemistry pertinent to atmospheric and occupational environments

Expected Outcomes

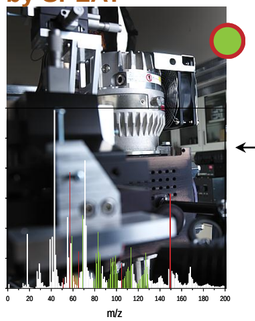
Development of methods for chemical imaging analysis of reacting environmental particles

Chemical imaging analysis of mixed organic/inorganic and soot particles by multi-dimensional characterization

I. Multidimensional Analysis of Soot Particles

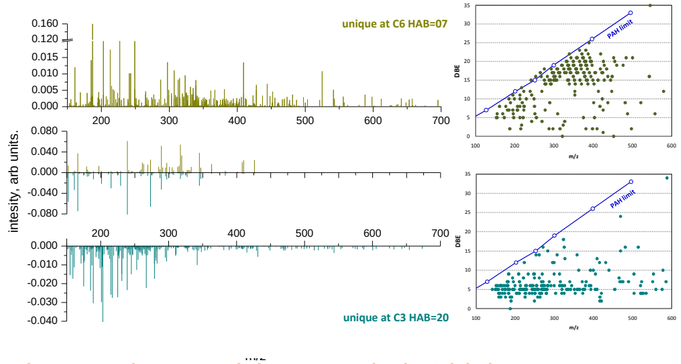


In situ analysis of individual particles by SPLAT



Soot particles generated in a Flat Flame Burner

High-resolution (-) nDESI-MS analysis of soot samples



Soot particles generated at different combustion regimes have different chemical and physical properties. Particles sampled at higher temperature form smaller fractal agglomerates, and their surface coating contains a larger fraction of aliphatic. The particles sampled at lower temperatures have surface coating dominated by polycyclic aromatic hydrocarbons, and form fractal agglomerates with two distinct modes.

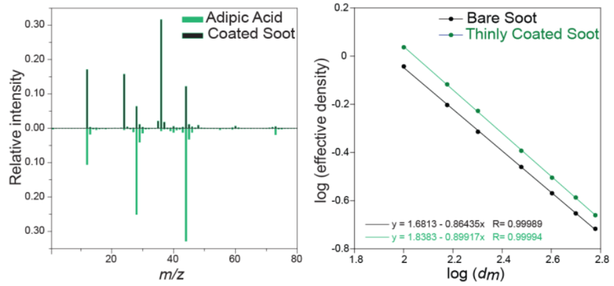
II. Probing Physical Chemistry of Particles with Chemical Imaging Techniques

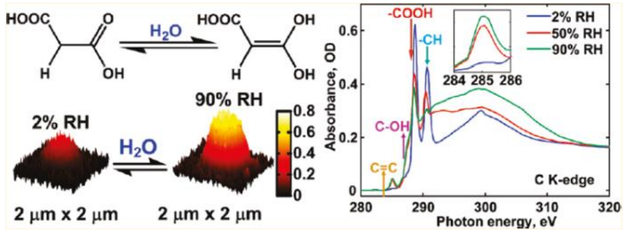
Internal structure, hygroscopic and reactive properties of mixed CH_3SO_3Na/NaCl particles

Y. Liu et al. *PCCP*, 13, 11846–11857 (2011).

Ice nucleation and droplet formation by bare and coated black carbon particles

Friedman et al. *JGR* (2011), in press.





Keto-enol tautomerism in deliquesced malonic acid particles

Ghorai et al. *JPC A, 115*, 4373-4380, (2011)

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