William R. Wiley
EMSL In Brief
Environmental Molecular Sciences Laboratory

# Kinetics of Sea Salt Particles Article Featured in Journal

A feature article authored by users and staff members of the Environmental Molecular Sciences Laboratory was published in the October 11, 2007, issue of *The Journal of Physical Chemistry A*. The article, "Kinetic Study of Heterogeneous Reaction of Deliquesced NaCl Particles with Gaseous $HNO_3$ Using Particle-on-Substrate Stagnation Flow Reactor Approach," was written by Yong Liu and Alexander Laskin of EMSL, and Jeremy Cain and Hai Wang of the University of Southern California.


*Yong Liu*


*Jeremy Cain*


*Hai Wang*


*Alexander Laskin*

"Feature articles are published by the invitation of the journal's Editor-in-Chief to draw an attention to important active research areas in physical chemistry," said Laskin. "This is an important recognition of our recent research focused on the gas-to-particle heterogenious chemistry."

The article reports on the development and implementation of a novel experimental approach, developed at EMSL, to study the kinetics of heterogeneous, gas-to-sea salt particle reactions. Sea salt particles are the second largest component, by mass, of global aerosol burden and contribute substantialy to atmospheric chemistry, air quality and climate change issues.

In the new approach, substrate-deposited particles are exposed to reactive gases, followed by chemical analysis of the particles, using advanced instrumentation in EMSL. The reactor design and flow parameters were guided by computational fluid dynamics performed by the USC team members to ensure the diffusion flux was uniform for all particles undergoing reaction. The experimental protocol and data interpretation were successfully implemented in laboratory studies focused on heterogeneous gas-to-particle reactions relevant the atmospheric chemistry of sea salt. A complementary combination of the reported results with previously published single particle mass spectrometry data was essential to understanding uptake kinetics over a wide range of particle sizes and experimental conditions.

The experimental approach offers options for multi-instrumental analyses of particle samples and, therefore, can be applicable to a wide variety of reactions of interest not only for the atmospheric chemistry community but also for the surface science and catalysis communities. The work was supported by Tropospheric Chemistry and Radiation Sciences programs at the National Aeronautics and Space Administration.

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