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Investigations of Hygroscopic Growth and Phase Transitions of Atmospheric Particles by Noncontact Atomic Force Microscopy (AFM). BENJAMIN OCKO, Brookhaven National Laboratory, SUSAN OATIS, University of New York, Stony Brook, MATTHEW STRASBERG, STEPHEN SCHWARTZ, ANTONIO CHECCO, Brookhaven National Laboratory — Aerosol particles (nanometer to micrometer sized particles suspended in air) affect atmospheric radiation and cloud microphysics. A correct description of their behavior in the atmosphere is essential to accurate climate modeling. The processes by which initially hydrophobic particles become hygroscopic, accrete water from the vapor, undergo phase transition from solid particles to solution droplets are important but not well understood at a fundamental level. We have carried out AFM studies to measure changes in particle size and morphology as a function of the relative humidity for particles of sodium chloride (a substance whose bulk hygroscopic properties are well characterized) deposited on substrates with differing surface energies (Silicon Oxide, Carboxy- and Methyl-terminated organic thin-films). For particles with height > 50 nm, deliquescence was observed with a relative humidity near 75% ($\pm 2\%$), is consistent with measurements of suspended aerosols. These preliminary results demonstrate that environmental AFM is a viable probe for studying the hygroscopic behavior of salt nanoparticles on solid supports. Supported by the U.S. Department of Energy, DE-AC02-98CH.

Benjamin Ocko
BNL

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