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FROM AMMONIUM SULFATE THROUGH AMMONIUM BISULFATE TO SULFURIC ACID: PHASE TRANSFORMATION IN ATMOSPHERIC AEROSOLS

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We present results from laboratory studies that use a new single particle levitation apparatus constructed and deployed at BNL. The sulfuric acid/ammonia system is the most prevalent atmospheric aerosol of anthropogenic origin. Yet, our knowledge of the most basic thermodynamic properties of this system is very minimal. Until recently there was but a single point from a complete ammonium bisulfate/water phase diagram in the literature. Data on non stoichiometric mixtures was virtually non existent. We have explored the phase diagram of this ternary system in composition and temperature spaces and mapped the equilibrium and non equilibrium phase transformations. In the process new phases have been discovered.