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Vibrational Spectroscopy of Aerosols in Titan's Atmosphere CHIA WANG, RUTH SIGNORELL, University of British Columbia — Aerosols play a crucial role in cloud formation, energy balance and chemical processes in terrestrial as well as extraterrestrial body's atmosphere (if there is one). Properties of these aerosols critically depend on their phase, size, shape, composition and architecture, which significantly differ from their bulk, liquid or gas phase counterparts. It is thus important to understand intrinsic properties of these aerosols at molecular level. Aerosols prevalent in Titan's atmosphere are demonstrated in this contribution. Aerosols are generated and suspended in a cooling cell and characterized by Fourier-transform mid-infrared extinction spectroscopy. Temperature, total pressure and mole fractions of targeted substances are carefully adjusted to mimic Titan's condition. The temporal evolution of aerosol formation and phase transition are monitored *in situ*, and thermal equilibrium of aerosols with the surrounding is established during the time of measurement. From the co-crystallization dynamics of acetylene and carbon dioxide, we demonstrate that an intrinsically-mixed $C_2H_2{\cdot}CO_2$ crystalline phase is formed, which in turn suggests regional abundance of trace species and intermolecular interactions between them are important factors for the formation of mixed aerosols at corresponding regional composition in Titan's atmosphere.

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