

In-situ X-ray Scattering Studies of Nanomaterial Growth Dynamics in Aerosols

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Nanomaterials display unique properties intermediate between those of the molecular and macroscopic regimes. The interest in application of nanomaterials has driven a desire to understand the fundamental mechanisms and processes involved in nanomaterial formation. Generally, nanomaterials are formed under non-equilibrium conditions with deep supersaturation and are commonly formed by extremely rapid growth processes that lead to kinetically dominated structural features. Aerosols offer transient and dramatic changes in temperature, concentration and stoichiometry that can be put to use to produce highly non-equilibrium conditions for nanomaterial formation. Our understanding of nanomaterial formation under these conditions can be studied in situ using synchrotron based techniques. This presentation will highlight some of the most important discoveries made during the past 2 years at ESRF and APS (USA) on flames and environmental aerosols. The work was supported by the Swiss National Science Foundation, the US National Science Foundation and Dupont Corporation.

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