

Small-Angle Neutron Scattering (SANS) for Characterization of Particulate Microstructures

Thursday 14 November 2024 09:40 (20 minutes)

Small-angle scattering (SAS), including neutron (SANS) and X-ray scattering (SAXS) techniques, enables in-depth examination of particle structure and composition at the nanometer scale, making it highly applicable for atmospheric research. This presentation will introduce the fundamentals of SANS, with a focus on its distinctive advantage of contrast variation, which allows selective visualization of specific particle components. By manipulating contrast agents such as D₂O and H₂O, SANS enables precise isolation of layers within complex particles, facilitating analysis of internal structures. A key example will feature core-shell particles, where contrast variation distinctly reveals core and shell regions, supporting quantification of water content and composition. SANS also allows for the analysis of surface properties and material porosity, offering insights into pore accessibility to solvents, particularly when a Porod regime - dominated by surface scattering - can be observed. Furthermore, SANS sheds light on the collective structures of nanoparticles, characterizing fractal geometries common in particles formed through aggregation. Beyond structural insights, SANS characterization enhances our understanding of the processes that govern aggregate formation, offering implications for atmospheric particulate growth and behavior.

Significance

Presenter: GASSER, Urs (PSI - Paul Scherrer Institut)

Session Classification: Solids and solid interfaces