55th MSS-Seminar

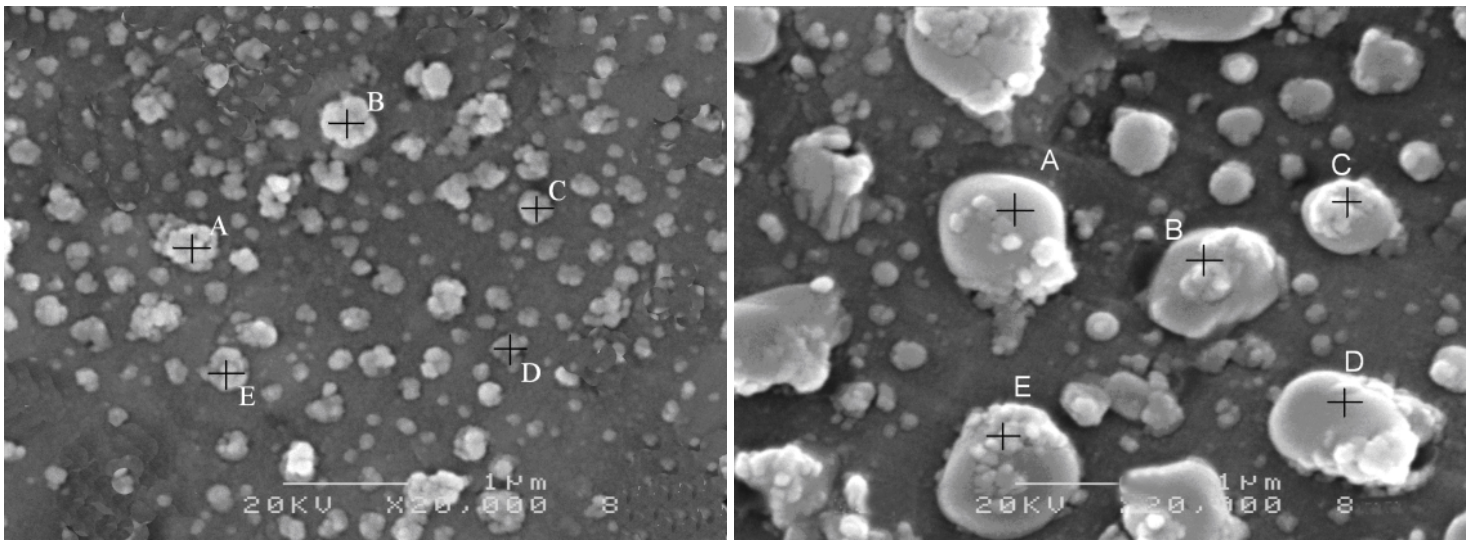
Wednesday, Dec. 18th, 15:30, Nägelsbachstr. 49b

MSS

Fine Particle Dynamics in the Acoustic Field and the Supersaturated Vapor Field

Fengxian Fan

University of Shanghai for Science and Technology, China



Fine particles (PM2.5) from industries are of concern because of their negative impacts on human health and the environment. It is difficult to separate these particles from effluent streams since the current particle removal technologies are more efficient to large sized ones. If the particles can be enlarged into 3~5 μm by preconditioning methods, high removal efficiencies can be achieved. A number of researches have shown acoustic field and supersaturated vapor field can be used to enable fine particle growth. However, the dynamic processes of particle growth are still not well understood. We numerically studied the dynamic processes of fine particles in the acoustic field and the supersaturated vapor field. Equations for particle motion and interaction in acoustic field were solved by a variable time-step fourth-order Runge-Kutta method. The acoustic particle collision and agglomeration were simulated using direct simulation Monte Carlo method. The effects of different mechanisms and parameters on particle dynamics in acoustic field were obtained. Heterogeneous condensation of supersaturated water vapor with fine particles as nuclei were investigated based on condensation growth theory. The influences of operational conditions (residence time, degree of saturation and temperature) and particle size distribution on condensation growth were obtained.