

# **Supercritical Fluids for Nanotechnology**

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Nanomaterials exhibit size- and/or structure-dependent properties, which must be controlled. Controlling the interaction between the component materials and medium is important in the formation of structures. This is particularly true for nanomaterials because their interaction energy is extremely large. Controlling the interaction between nanomaterials and the medium is crucial, together with the surface design. Supercritical fluids can freely control the physical properties and phase behavior, thus tuning the interaction between nanomaterials. Therefore, supercritical fluid technology should be used for the synthesis of nanoparticles, surface design, and formation of nanostructures, thus solving the problems associated with conventional processes. For the rational design of nanomaterials and synthetic process, a holistic understanding of the phase equilibria, solvent effect on kinetics, interaction between nanomaterials and the fluid, and the transport phenomena in supercritical fluids is necessary. This approach will help establish the “unit operation” of supercritical fluids. The use of supercritical fluids can also be an effective approach for understanding the mechanism of formation of nanostructures. Through fusion with other categories of science, such an approach could pave the way for establishing a holistic nanomaterials science.