

Abstract Submitted
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Revealing nanoparticle assembly under high pressure. HONGYOU FAN, Sandia Natl Labs — Precise control of structural parameters through nanoscale engineering to improve optical and electronic properties of functional nanoparticles continuously remains an outstanding challenge. Previous work on nanoparticle assembly has been conducted largely at ambient pressure. Here I will present a new Stress-Induced Fabrication method in which we applied high pressure or stress to nanoparticle arrays to induce structural phase transition and to consolidate new nanomaterials with precisely controlled structures and tunable properties. By manipulating nanoparticle coupling through external pressure, a reversible change in their assemblies and properties can be achieved and demonstrated. In addition, over a certain threshold, the external pressure will force these nanoparticles into contact, thereby allowing the formation and consolidation of one- to three-dimensional nanostructures. Through stress induced nanoparticle assembly, materials engineering and synthesis become remarkably flexible without relying on traditional crystallization process where atoms/ions are locked in a specific crystal structure. Therefore, morphology or architecture can be readily tuned to produce desirable properties for practical applications. Sandia National Laboratories is a multi-mission laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Hongyou Fan
Sandia Natl Labs

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