

Aiiso Yufeng Li Family Department of
Chemical and Nano Engineering

Department Seminar

Wednesday, May 13, 2026

11:00am – 12:00pm PT

SME 248



Dr. Hongyou Fan, PhD

*“Pressure-induced nanoparticle
assembly”*National Laboratory Professor
Sandia National Laboratories

Abstract: Precise control of structural parameters through nanoscale engineering to improve optical and electronic properties of functional nanomaterials continuously remains an outstanding challenge. Previous work on nanoparticle synthesis and assembly has been conducted largely through solution chemistry at ambient pressure and relies on specific chemical or physical interactions such as van der Waals interactions, dipole-dipole interactions, chemical reactions, ligand-receptor interactions, etc. In this presentation, I will introduce a new pressure-induced assembly and fabrication method that uses mechanical compressive force applied to nanoparticles to induce structural phase transition and to consolidate new nanomaterials with precisely controlled structures and tunable properties. By manipulating nanoparticle coupling through external pressure, instead of through solution chemistry, 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 pressure 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. (SAND2024-006110)

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Bio: Hongyou Fan currently serves as R&D Manager, DOE Office of Science Sandia BES Geoscience Program Manager, Sandia Critical Materials Program Manager and a Distinguished Member of Technical Staff at Sandia National Laboratories. He received a B.S. degree from Jilin University and a Ph.D. degree from University of New Mexico. He was a postdoctoral fellow at Sandia National Laboratories, Albuquerque, New Mexico, before working there full time. Dr. Fan's research focuses on interfacial self-assembly and nanoscale colloidal materials that enable efficient charge and energy transport for nanoelectronics, energy, and biological applications. Dr. Fan is a Fellow of NAI, MRS, ACS, APS, and RSC. His honors include the MRS Mid-Career Researcher Award, the MRS Medal, and the MRS Fred Kavli Distinguished Lectureship Award in Nanoscience. He was recognized as the Asian American Engineer of the Year in 2012 and received the Society of Asian Scientists and Engineers (SASE) Career Achievement Award in 2022.

His inventions have earned seven R&D 100 Awards for groundbreaking and innovative technologies, along with six Federal Laboratory Consortium (FLC) Outstanding Technology Development Awards. Among these distinctions are the R&D 100 Researcher of the Year Award, the FLC Outstanding Researcher Award, and the FLC Technology Transfer Award for commercializing Long-Lasting Disinfectant 2.0.

Seminar Host: Zheng Chen