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3:00 pm
APS Auditorium, Building 402, Argonne National Laboratory
APS Colloquium home

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Self-Assembly of Nanoparticle Superlattices, Chains, and Wires

Self-assembly is emerging as an elegant, "bottom-up" approach to fabricating nanostructured materials. Furthermore, by combining the ease and control of self-assembly based on organic materials with the special electronic, magnetic or photonic properties of inorganic components, powerful new functionality can be achieved. This talk discusses two types of self-assembled systems: uniform, extended nanocrystal monolayer superlattices and copolymer-templated nanoparticle aggregates. In the latter, control of the metal-metal and metal-polymer interactions can be used to produce either dense chains of closely-spaced but separate nanoparticles or continuous nanowires.

Heinrich Jaeger earned a Vordiplom in physics (B.S.) at the University of Kiel in Germany in 1979. In 1981, he received a Fulbright Scholarship to study at the University of Minnesota in Minneapolis for one year, obtaining a M.S. degree in physics in 1982. After a year in Germany, he returned to Minneapolis and finished his Ph.D. in physics in 1987, working on ultrathin superconducting films. He spent 15 months at the University of Chicago as a James Franck Postdoctoral Fellow before accepting a position as a Senior Researcher at the Delft Institute for Microelectronics and Submicrontechnology in The Netherlands. Hi joined the faculty at the University of Chicago in 1991. Dr. Jaeger is now a Professor in the Department of Physics, the James Franck Institute and the College. He is currently the Director of the Chicago Materials Research Center and Co-Director of the UC-Argonne Consortium for Nanoscience Research.

Jaeger received a David and Lucille Packard Fellowship for Science and Engineering in 1991, an Alfred P. Sloan Fellowship in 1992, and a Research Corporation Cottrell Scholarship in 1994. In 1995 he was named one of Crain's Chicago Business' "40 under 40", and in 2001 received the University of Minnesota Outstanding Achievement Award.

Jaeger's research interests focus on the understanding and control of materials, crossing the boundaries between "hard" condensed matter physics (electronic and magnetic properties of metals, semiconductors and superconductors) and "soft" condensed matter physics (fluid dynamics, bio-physics, nonlinear dynamics). Currently, his group is involved in projects ranging from the assembly of novel, next-generation nanostructures to investigations of the complex nonlinear behavior of granular materials (these materials include grain, gravel, or pharmaceutical pills all the way to ultrafine powders and are key to many of industrial processes). Jaeger is author or co-author of over 100 scientific publications.