

2022 CAROLYN AND CHARLES KNOBLER LECTURE



Prof. David J. Pine

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Monday, February 14, 2022
4:00 PM
Young Hall 2033

“Self-assembly of colloidal diamond for photonics”



Abstract: Self-assembling colloidal particles into the cubic diamond structure has been a longstanding goal because of its potential for making materials with a photonic band gap. These materials suppress spontaneous emission of light and are valued for their applications as optical waveguides, filters, and laser resonators, for improving light-harvesting technologies, and for other applications. This talk will describe a method for making colloidal particles that self-assemble into cubic colloidal diamond. The particles consist of partially compressed tetrahedral clusters with retracted sticky patches that self-assemble using patch-patch adhesion in combination with a steric interlock mechanism that selects the proper staggered bond orientation required for cubic diamond. The talk will also describe the self-assembly of these particles into the cubic diamond structure and their use as templates to form high-dielectric-contrast inverted photonic diamond crystals with a wide complete photonic band gap.