Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Self-assembled colloidal alloys of clusters and spheres: Diamond, Pyrochlore and Unnatural Crystals ETIENNE DUCROT, NYU, GI-RA YI, SKKU, DAVID PINE, NYU — The assembly of percolating low volume fraction ordered structures at the colloidal scale is a challenging problem with applications in photonics and in the emerging field of metamaterials. DNA coated particles have been proposed and successfully applied as a versatile tool for programming the self assembly of micrometer size particles. Nevertheless highly though out percolating structures such as diamond and pyrochlore lattices failed self-assembly. Here we present a new design principle that uses the combination of DNA coatings and elementary preassembled components to build colloidal alloys with self assembled lattices never build before. Mixed with complementary spheres, preassembled parts of the desired structure arrange particles around them, imposing a local symmetry otherwise inaccessible using only short-range interactions and spherical particles. Guided by Brownian dynamics simulations, we apply this strategy to the self assembly of spheres with colloidal tetrahedral clusters leading to a family of colloidal superstructures, among which percolating diamond and pyrochlore as well as cubic and tetragonal colloidal crystals with no known atomic equivalent.

Etienne Ducrot
NYU

Date submitted: 11 Nov 2016 Electronic form version 1.4