Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

**Self-Assembly of 3D Non–Close-Packed Colloidal Structures** VYOM SHARMA, DEYING XIA, CRAIG CARTER, YET-MING CHIANG, MIT, C. C. WONG COLLABORATION — The ability to direct the position of colloidal particles in a 3-dimensional structure has led to the formation of non–close-packed structures which exhibit complete photonic-band gap. Currently, researchers use templates to make these structures and position colloidal particles one-by-one. Here, we show that by manipulating the electrical potential and concentration within a binary system of colloidal particles, it is possible to create a non–close-packed layer of binary particles through self-assembly. On repeating the above steps, we show that a second layer was obtained on top of the first layer. Finally, by burning off one kind of particle-type in the end, we obtain the first two layers of a diamond cubic unit cell. Our method relies on controlling the electrical potential of the system and the concentration of particles only. As a result, we show that by using different kinds of templates, structures with different symmetries can be obtained. To our knowledge this is the first demonstration of colloidal self-assembly to obtain non–close-packed structures 3D structures.

Vyom Sharma
MIT

Date submitted: 15 Dec 2009 Electronic form version 1.4