Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 01.1.17 (E)

Heterogeneous 3D Assembly of DNA-encoded Quantum Dots and Gold Nanoparticles[1] DAZHI "PETER" SUN, OLEG GANG, Center for Functional Nanomaterials, Brookhaven National Laboratory — We report the heterogeneous assembly of quantum dots (QDs) and gold nanoparticles (AuNPs) into three-dimensional (3D) superlattices by means of DNA encoding. CdSe/ZnS core-shell QDs were functionalized with stranded (ss) DNA to obtain a stable aqueous dispersion of QD-DNA conjugates, which maintains the optical properties of the original QDs. By introducing AuNPs modified by complementary ssDNA, QD-AuNP aggregates were assembled. Using synchrotron-based small angel X-ray scattering, we found that QD-AuNP assemblies form a body center cubic (BCC) lattice, while each nanoparticle type, QD and AuNP, are positioned in a simple cubic (SC) manner. Distance-dependent optical property of QDs in heterogeneous superlattices was studied by time-resolved fluorescence spectroscopy. The potential applications of the above optically-active nanosystems will also be discussed.

[1]Research was supported by the U.S. Department of Energy, Office of Basic Energy Sciences, under Contract No. DE-AC02-98CH10886.

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[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 15 Dec 2011 Electronic form version 1.4