



Contribution ID: 3

Type: **not specified**

Determining the complex Structure of Nanocrystal Superlattices

Wednesday, 19 December 2018 18:00 (15 minutes)

We present the structural study of soft-epitaxial superlattices on the designed templates¹. We prepare templates of ordered superlattices of PbS NCs, coupled with copper tetraaminophthalocyanines (CuTAPc) molecules². PbS NCs of different sizes are deposited on the surface of templates and the adlayer superlattices are further functionalized with CuTAPc. We investigate the structure of the templates and the adlayer NC assemblies by using grazing-incidence small angle x-ray scattering (GISAXS) and grazing incidence x-ray diffraction (GIXD)³. The deposited NCs self-assemble not only into ordered superstructures (sc, bcc), but also into a preferred atomic orientation with respect to the templates⁴. Moreover, after functionalization, the bcc superlattices undergo a remarkable orientational change from [110]SL to [100]SL via lattice reconstruction⁵. Finally, we highlight our recent results on the solvent evaporation-induced assembly of CuS NCs on the solid surface, monitored simultaneously by GISAXS and SAXS in real-time. For the first time, we observe the signature of dodecagonal quasi-crystalline superstructure formation using only type of NCs⁶. There are still few open issues which we would like to discuss in workshop.

Title

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Session Classification: User session