Talk

Colloidal Nanocrystals & Supercrystals investigated by combined X-ray Scattering Techniques

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The chemical synthesis of colloidal nanocrystals (NCs) is a well-established method providing highly monodisperse quantum dots [1] for applications such as e.g., fluorophores or magnetic nanoparticles [1,2]. The morphology of NCs has a substantial influence on their highly diverse physical properties. Controlling the morphology of NCs during the synthesis and the ability to analyse this morphology of a significant number of particles is one key research interest in this field. Besides the more common transmission electron microscope (TEM), small angle X-ray scattering (SAXS) at lab and synchrotron sources is a leading technique for analysing the morphology of colloidal nanocrystals with sub-nanometre resolution. The combination with diffraction techniques (XRD/WAXS) yields additionally the NCs' crystalline properties.The material combinations ranges from CdSe/CdS core/shell NCs [3] over environmentally benign InP/ZnO/ZnS core/shell/shell NCs [4] to magnetic FeO NCs [2], where we could follow their shape transition from nanostars to nanocubes [5].The NC's shape can also significantly influence the super-crystal structure of colloidal supercrystals SCs [1], where NCs act as building blocks to form 3D nanocrystal solids with designed properties [1, 6]. We followed this supercrystal growth by in-situ SAXS studies combined with MC-simulations [6]. Very recently, we used also faceted semiconducting PbTe/PbS NCs (synthesised by the Ibanez-Lab) as building blocks for growing and characterising micrometre sized supercrystals.

Wednesday, April 26, 2023 02:00pm - 03:00pm
Sunstone Building - Big Seminar Room A

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