MSS-Seminar

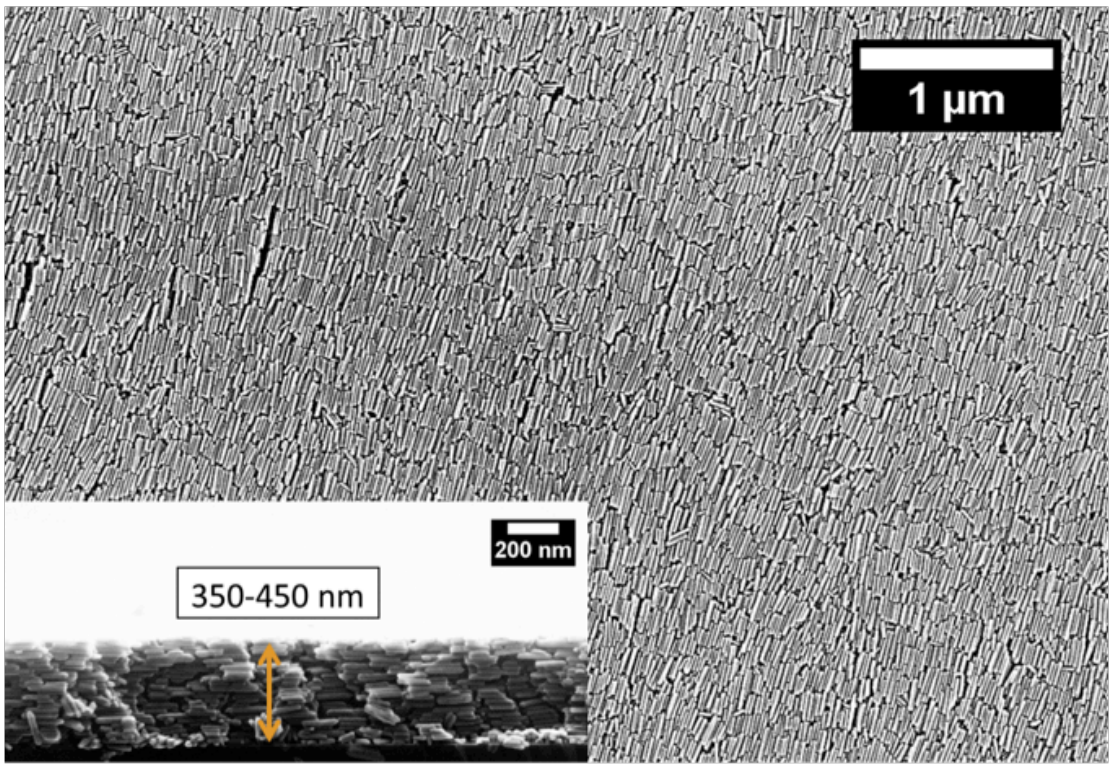
Wednesday, Nov. 14th, 15:30, Nägelsbachstr. 49b

MSS

Study of film formation during the alignment of ZnO nanorods in functional thin films

Rubitha Srikantharajah

Institute of Particle Technology, University of Erlangen-Nuremberg, Germany



Nanoparticulate thin films are of high interest as they work as functional layer in electronic applications. The use of thin films as semiconducting or conducting layer in field effect transistors (FETs), solar cells or displays are some examples. The properties of solution processed thin films are varying from highly porous to very densely packed nanoparticles according to their field of application. The formation of thin films by self-assembly of anisotropic nanoparticles from dispersions is a gentle method as they can be produced at room temperature. But until now the mechanisms of film formation and the reproducible control of self-assembly is far from being understood. In order to understand film formation, the control of the particle interactions, the drying behaviour of the dispersions and the wetting behaviour of the substrate are of high interest. Therefore we investigate the structural evolution of the particulate network as a function of solid concentration and the stability parameters of dispersions. With a steric stabilization mechanism we produce highly stable dispersions against agglomeration and sedimentation. The stability of the dispersions is validated by dynamic light scattering and UV-Vis spectroscopy. The drying behaviour of these dispersions is investigated in ambient conditions. Additionally nitrogen and argon gas atmospheres are applied in order to vary humidity in a drying chamber. By polarizing microscopy we identify liquid crystalline structures and investigate the drying behaviour in situ with video microscopy. The dried films are investigated by scanning electron microscopy. We show that the stability of the dispersion is strongly influencing the self-assembly process of the nanorods. With single-stabilized nanorods in dispersions we produce self-assembled nanorod structures in parallel to the substrate with lateral extension of several μm to cm (see figure 1).