O 46: Invited Talk Stefan Mayr (Gaede Prize)

Time: Wednesday 13:30–14:15 Location: HE 101

Prize Talk O 46.1 Wed 13:30 HE 101

Structure formation, kinetics and mechanics in thin films and solids: from nanoscale to macroscopic properties in experiments and simulations. — •Stefan Georg Mayr — I. Physikalisches Institut, Georg-August-Universität Göttingen — Träger des Gaede-Preises

Macroscopic properties of functional thin films and solids, including structure and mechanics, are frequently dominated by processes at the atomic level, while the growing demand for miniaturization in science and technology has strongly triggered interest in nanoscale phenomena. Fine tuning and creation of new materials can thus greatly benefit from a detailed understanding across time and length scales. To achieve this, we employ a complimentary approach of experiments, atomistic computer simulations and analytical modelling, which we exemplify in two instances: We report about our studies on i) the mechanisms of self-organized structure formation at surfaces in driven systems and on ii) the nanomechanics in disordered solids. While i) combines an external forcing (materials deposition, energetic ions, templates) with intrinsic thermodynamics / kinetics to induce pattern formation or ultrasmooth surfaces, ii) is characterized by the occurrence of a highly heterogeneous dynamics in response to stress. In both cases, i) and ii), we choose metallic glasses as model systems due to their spatial isotropy, but also investigate generalizations to non-metallic as well as crystalline systems. Recent implications for the miniaturization of functional thin films and applications are also discussed. *Funded in part by the DFG - SFB 602 (TP B3), DFG - SPP 1239(TP C4) and GIF 428-303.1.*