O 9: Invited talk (Hartmann, Nils)

Time: Monday 14:00–14:45 Location: H36

Invited Talk O 9.1 Mon 14:00 H36

Sub-Wavelength Patterning of Ultrathin Organic Coatings via Nonlinear Laser Processing — •Nils Hartmann — Fakultät für Chemie, CeNIDE, NETZ, Universität Duisburg-Essen, Germany

Laser patterning represents a key step in many technological applications. The lateral resolution, however, usually is limited by optical diffraction. A means to enhance the lateral resolution takes advantage of nonlinear effects. In photothermal laser processing, for example, a focused laser beam is used to locally heat the substrate surface and to thermally initiate chemical reactions. For this reason, photothermal processing is highly nonlinear in laser power density and facilitates sub-wavelength patterning. Femtosecond laser processing, as another example, provides promising perspectives in sub-wavelength patterning via multiphoton absorption processes. A general account on recent achievements in nonlinear laser patterning of ultrathin organic coatings, such as self-assembled monolayers and supported lipid membranes, is given [1-3]. Because of their exceptional stability, nonlinear laser processing of silane-based monolayers is most effective [1-2]. In particular, photothermal laser processing at $\lambda = 514$ nm and a $1/e$ spot diameter of 1.8 μm allows one to fabricate functional surface structures with lateral dimensions well below 100 nm [1]. Such structures are used as reactive templates to build up functional surface nanostructures via directed self-assembly of nanoscopic components.

[1] D. Dahlhaus et al., Nano Lett. 6 (2006) 2358.
[2] N. Hartmann et al., APL 92 (2008) 223111.
[3] M. Mathieu et al., Small 5 (2009) 2099.