

DS 18: Gaede Prize talk (Mato Knez)

Time: Tuesday 13:30–14:00

Location: HE 101

Prize Talk

DS 18.1 Tue 13:30 HE 101

Material Design by Atomic Layer Deposition — ●MATO KNEZ
— Max Planck Institute MSP, Halle, Germany — CIC nanoGUNE
Consolider, San Sebastian, Spain

Atomic layer deposition (ALD) is a thin film deposition technique which was developed in the 1970s. In contrast to chemical vapor deposition (CVD), ALD incorporates the separation of the chemical reaction into two half-reactions with a growth control in a cycle by cycle manner, allowing good coating conformality even on structures with high aspect ratios. A combination of diffusion effects and ALD coating can largely extend the variation parameters of the materials design. For example, using the deposited films as platform for further chemical or physical manipulation by means of interfacial diffusion or

as sacrificial spacers enables the synthesis of nanovoids or nanoparticle assemblies in a very elegant way. A further side-effect of the ALD process was investigated in more detail: If polymers are used as substrates, the highly reactive precursors can diffuse into the bulk of the polymer and chemically interact with it. As a result, physical properties of the substrates in many cases significantly alter during the process. Our focus is primarily on the mechanical properties of (bio)polymers which in many cases are most seriously changed. In summary, ALD is a method-of-choice for many applications in materials design and functionalization. Instead of being just an instrument for coating, it opens possibilities for research and development in various fields. Especially the infiltration of metals into soft materials shows a distinct, but important difference between ALD and CVD and thus its uniqueness.