Physikalisches Kolloquium Universität Kiel
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When (Two) Surfaces Meet

At every surface there are facinating phonomena waiting to be understood. *In situ* X-ray diffraction can provide a unique insight into the atomic structure at interfaces. For solid interfaces, strain and defects play an important role in defining the characteristic behaviour during growth or in response to an applied field. In contrast, liquids provide strain- and defect-free interfaces with rich properties and can act as a novel template for investigating growth phenomena.
Magnetoelectric composite materials are promising candidates for highly sensitive magnetic field sensors. We show that both geometry and sample growth play an important in strain behaviour at the interface of these magnetoelectric composites. High-resolution grazing incidence diffraction was used to determine magnetic field-induced strain at the Metglass/ZnO planar interface[1]. Additionally, *in situ* nanofocus X-ray diffraction enabled the local mapping of the magnetoelectric microcomposite properties of ZnO microrods coated with amorphous Metglass. Here, we observe a strong enhancement of magnetic field induced strain resulting in a strong local strain up to 10^{-5} at the ZnO interface [2].
Electrochemical interfaces between imiscible liquids have lately received renewed interest, both for fundamental insight as well as for applications in nanomaterial synthesis. We demonstrate that the atomic scale structure of these previously inaccessible interfaces nowadays can be explored by *in situ* synchrotron based X-ray scattering techniques. Exemplary studies of a prototypical electrochemical system – the liquid mercury electrode in pure NaCl solution - reveal that the liquid metal is terminated by a well-defined atomic layer. [3]. In similar studies performed for the electrochemical deposition of PbFBr, a complex nucleation and growth behaviour is found[4]. *Operando* X-ray scattering measurements provide detailed data on the processes of nanoscale film formation[5].

[1] Abes, Koops, Hrkac, Greve, Quandt, Collins, Murphy, Magnussen, *Appl. Phys. Lett.*, 2013, **102**, 011601
[2] Hrkac, Abes, Koops, Krywka, Müller, Kaps, Adelung, McCord, Lage, Quandt, Magnussen, Murphy, *Appl. Phys. Lett.*, 2013, **103**, 123111
[3] Elsen, Murphy, Ocko, Tamam, Deutsch, Kuzmenko, and Magnussen, *Phys. Rev. Lett.*, 2010**, 104**, 105501
[4] Elsen, Festersen, Runge, Koops, Ocko, Deutsch, Seeck, Murphy, Magnussen, *PNAS*, 2013**, 110**, 6663.
[5] Murphy, Festersen, Magnussen, *Nanoscale*, 2016, **8**, 13859

Der Vortrag beginnt um **12:15 Uhr** im **Max-Planck-Hörsaal (LS13-R.8)** des Physikzentrums.
Ab **12:00 Uhr** werden **Kaffee** und **Tee** angeboten.

M. Bonitz
für die Dozenten der Physik

Gastgeber: Prof. Magnussen