

Monitoring the swelling behaviour of PEDOT:PSS thin films under high humidity conditions

Tuesday, 20 June 2017 11:40 (20 minutes)

Towards flexible substrates for organic light emitting diodes and organic photovoltaics it is of significant interest to replace brittle and costly electrodes like ITO or FTO as well. PEDOT:PSS offers with its good conductivity, easy processibility, and inherent flexibility a suitable alternative to its rigid and transparent conducting oxide counterparts.

The hygroscopic behavior of the PSS content yields a high potential water uptake of the PEDOT:PSS electrode itself. This is known to have an influence on its electronic conductivity but also on its film thickness. Furthermore, an increasing film thickness due to water uptake may lead to stress onto the organic devices and their containing layers, which yields an additional failure potential due to mechanical stress.

Hence, in-situ time of flight neutron reflectometry measurements were performed on different PEDOT:PSS films, which were exposed to high moisture conditions. By monitoring the swelling behavior of the spin-coated thin films, we were able to follow the thickness evolution and the water uptake of the film regarding to the ambient relative humidity conditions.

The experiments were conducted at the REFSANS beamline at FRM II, Garching.

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Session Classification: Parallel Session