



Science Week

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Typ: Oral

Analysis of the Electric-Double-Layer formation by in-situ Rutherford Backscattering Spectrometry

Dienstag, 24. April 2018 11:50 (20 Minuten)

A setup for in-situ Rutherford Backscattering Spectrometry (RBS) has been installed at the 2 MV Van-de-Graaff accelerator at the Ion Beam Center (IBC) of the Helmholtz-Zentrum Dresden-Rossendorf (HZDR). Online analysis of solid-liquid interfaces as well as electro-chemistry experiments are conducted by this technique. A Si₃N₄ window separates the liquid from the vacuum in the RBS chamber. A He⁺ beam ($E = 1.7$ MeV) is utilized for the RBS measurements. RBS as well as Particle Induced X-Ray Emission Spectroscopy (PIXE) spectra are recorded simultaneously to increase the sensitivity for trace elements. The technique was employed for direct measurements of the Electric-Double-Layer (EDL) formation on Si₃N₄. Investigations of the EDL formation at solid-liquid interfaces are of great significance due to the various valuable applications such as super-capacitors that can be utilized to provide a backup power supply or applied in various other fields [1-3]. In our preliminary experiments, the specific adsorption of Barium ions from a 1mM BaCl₂ solution with various pH values was observed in a direct and quantitative manner. Sensitivity of the technique reaches the ppm range and areal densities can be measured down to 0.1 atomic monolayer.

[1]Kötz et al., (2002). The 12th International Seminar on Double Layer Capacitors and Similar Energy Storage Devices, Dec, USA.

[2]Faggioli et al., (1999). J. Power Sources, 84(2): 261.

[3]Simon et al., (2008). Nature materials, 7(11): 845.

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