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Invited talk "EMIL - a novel research platform for energy materials at the BESSY II synchrotron light source"

Tuesday, 16 June 2015 15:30 (50 minutes)

A knowledge-based approach towards developing materials for energy conversion and storage application requires a fast and direct feedback between sophisticated analytics and state-of-the-art material processing facilities. At the Energy Materials In-situ Laboratory Berlin (EMIL) we achieve this by coupling synchrotron-based X-ray characterization techniques (such as XPS, HAXPES, XRD, XES, XAS, XRF, PEEM) with relevant in-system/in-situ sample preparation techniques on up to 6" substrates in one dedicated ultra-high vacuum (UHV) system. EMIL is a joint project between Helmholtz-Zentrum Berlin and the Max Planck Society and will be operational at the BESSY II light source in 2016. EMIL has the most complex beamline so far constructed at BESSY II and will provide light in a wide energy range from 70 –10.000 eV [1]. To achieve this, a new light source consisting of two canted undulators will be installed into the BESSY II storage ring and two plane-grating and one double-crystal monochromator disperse the radiation in separate pathways, while ten mirror chambers distribute the desired photon energy to five experimental endstations. A new 2000m² large infrastructure consisting of deposition, chemistry and spectroscopy labs as well as a cleanroom facility is attached to the BESSY II mantle and will host three of the five endstations. These three endstations are designed for accepting the full energy range with spatial overlap of the soft and hard foci allowing in-system and in-situ X-ray spectroscopy. Two endstations are connected through a huge UHV transfer system to up to 20 different deposition systems [2].

In this presentation, I will provide an overview of the analytic and material capabilities at EMIL and report on the status and timeline of the project. I will discuss the overall estimated performance and highlight how EMIL can trigger research opportunities for future user operation.

References

- [1] R. Follath, M. Hävecker, G. Reichardt, K. Lips, J. Bahrtdt, F. Schäfers, and P. Schmid, J. Phys.: Conf. Ser. 425 212003, p.1-4 (2013).
- [2] K. Lips, D.E. Starr, M. Bär, T.F. Schulze, F. Fenske, S. Christiansen, R. van de Krol, S. Raoux, G. Reichardt, F. Schäfers, S. Hendel, R. Follath, J. Bahrtdt, M. Scheer, G. Wüstefeld, P. Kuske, M. Hävecker, A. Knop-Gericke, R. Schlögl, and B. Rech, Photovoltaic Specialist Conference (PVSC) IEEE 40th , p.698-700 (2014).

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