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Free thin film sample preparation for Users by Molecular Beam Epitaxy

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Molecular Beam Epitaxy (MBE) is a versatile tool to fabricate high quality and high purity epitaxial thin films with low intrinsic defect concentrations and atomic-layer control.

At the MLZ, the Jülich Centre for Neutron Science (JCNS) runs an MBE system to provide samples for users who either do not have the expertise to prepare thin film samples for their Neutron experiments and/or the equipment.

The MBE system is equipped with effusion cells, electron guns for electron-beam evaporation and a plasma source which may be run with oxygen or nitrogen.

A large variety of deposition materials can be used. Compounds are produced either by codeposition or by shutter modulated growth of individual layers. For in-situ surface structure analysis reflection high and low energy electron diffraction is utilized while Auger electron spectroscopy is applied for in-situ chemical surface analysis.

Thin films samples which are sensitive to ambient conditions are first fabricated in the MBE system and then measured at the neutron reflectometer MARIA of the JCNS utilizing a versatile small ultra high vacuum condition chamber. [1]

In our presentation we will give examples for high quality thin films like Fe₄N, SrCoO₃ or Nb/Al₂O₃(1-1 0 2).

We are looking forward to discuss with you!

[1] A. Syed Mohd, S. Pütter, S. Mattauch, A. Koutsoubas, H. Schneider, A. Weber, and T. Brückel, Rev. Sci. Instrum., vol. 87, pp. 123909, 2016

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