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Thin film growth by Molecular Beam Epitaxy for MLZ users

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Molecular Beam Epitaxy (MBE) is a versatile tool to fabricate high quality and high purity epitaxial thin films. At 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.

In other words: If you need thin film samples for your neutron experiments, let's discuss how we can prepare your samples!

The MBE system is equipped with effusion cells, electron guns for electron beam evaporation and a plasma source for use 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 film samples which are sensitive to ambient conditions are first fabricated in the MBE system and then measured at the neutron reflectometer MARIA of JCNS utilizing a versatile small ultra high vacuum condition chamber.[1]

In our presentation we will present examples for high quality thin films like e.g. FeN, Fe₄N, SrCoO₃ or Nb/Al₂O₃ (1-1 0 2) and link them to neutron experiments.

[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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