Contribution ID: **436** Type: **Poster**

Pulsed Laser Deposition setup for in-situ experiments with at neutron and synchrotron sources.

Monday, 17 September 2018 17:55 (5 minutes)

Phenomena and effects on interfaces and in individual atomic layers play a key role in the modern material science, especially in the field of nanotechnologies (nanoelectronics, photonics, plasmonics, etc). The pulsed laser deposition (PLD) technique is a versatile tool with a capability of using a wide variety of materials to produce such structures. Neutron radiation offers a unique possibility for in-situ investigation of multilayer thin films growing processes and for investigation of the as-grown structures. In particular, the method of spin-sensitive neutron polarization reflectometry (NPR) (in the low temperatures (<15 K) and high magnetic fields (>1 T) is extremely sensitive for the structural and magnetic properties of materials. Moreover, synchrotron sources offer a unique tool for in-situ characterization of the initial growth stages and interfaces of thin films and multilayers. XPS, XRD, XMCD, SMS - this is not a complete list of great techniques for in-situ research. Drawing on our own in situ PLD experience at synchrotrons and neutron facilitates and in view of the very wide range of scientific tasks that can be solved by such approach, we have developed a series of mobile PLD setups for various in-situ and in-vacuo synchrotron and neutron techniques. All devices have a mobile configuration and have to be compatible with the existing and future beamlines and instruments. In the presentation, we will give an overview of the experimental chambers and concepts and their application fields. Also, some results of our in-situ PLD investigations with at PETRA III will be presented.

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Session Classification: Poster session 1

Track Classification: P5 Thin films, 2D materials and surfaces