***In-situ* X-ray Diffraction during Pulsed Laser Deposition**

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Pulsed Laser Deposition (PLD) has become a widespread technique for fabrication of thin films. A powerful pulsed laser is used to create a plasma off a target material, which is subsequently epitaxially deposited on a heated single crystal substrate. The PLD process can take place at relatively high oxygen pressures (up to 100 Pa), thereby making it especially suited for the deposition of High-T_c superconductors. For the purpose of studying the crystalline structure of the film during growth, a special sample chamber has been constructed to be used with synchrotron X-rays. The first results of deposition of thin films of $Yba_2Cu_3O_{7-x}$ on $SrTiO_3$ substrates were obtained at the European Synchrotron Radiation Facility. From intensity oscillations of the specularly reflected X-ray beam it is concluded that growth proceeds in a layer-by-layer fashion. Deposition was interrupted several times, which allowed for detailed structural characterization of the grown film at the deposition temperature of 780 °C, where pronounced Kiessig fringes show that the surface is particularly smooth [1].

[1] Vonk V., et al., *ESRF Highlights*, 2004 (2005).

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