DS 26: Birkholz

Time: Thursday 13:45–14:15 Location: H 2013

Invited Talk DS 26.1 Thu 13:45 H 2013

Profiling of Fibre Texture Gradients by Anomalous X-ray Diffraction — •M. Birkholz[1], N. Darowski[2], and I. Zizak[2] — [1]IHP, Im Technologiepark 25, 15236 Frankfurt (Oder) — [2]HMI & Bessy, Albert-Einstein-Str. 15, 12489 Berlin

Preferred crystallographic orientation or texture is a typically observed phenomenon in polycrystalline thin films. In numerous studies, moreover, the texture strength was found to increase with layer thickness. The effect is of practical relevance, since many applications require an intentionally perfect alignment of crystallites as, for instance, in piezoelectric layers of SAW devices. So far, sample series of increasing thickness had to be prepared with the texture strength to be determined for each sample to derive estimates of the texture gradient.

A recently introduced technique allows for the quantitative determination of a fibre texture gradient in a single thin film (M. Birkholz, JAC 40 (2007) 735). The method operates by varying the average information depth of the XRD measurement via changing the wavelength. If this variation encompasses an absorption edge of one of the elements present, sufficiently large variations of the x-ray attenuation arise that allow for texture profiling at different depths. As an example, a study of thin ZnO:Al films will be presented that were measured at Bessy II. These layers were found to exhibit large texture gradients with the highest value of 0.3 m.r.d./nm to occur in the initial growth phase, i.e. with a texture increase of 1 multiple of a random distribution every 3 nm. Summarizing, this new method enables the determination of texture gradients as required in many thin film projects.