## XRD Study of Strongly Textured and Stressed thin Films

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Determination of the residual stress in highly oriented thin films can be rather difficult. Since only certain grain orientations are present, conventional X-ray methods of stress evaluation cannot be applied. In some cases, the problem can be solved by the so-called crystallite group method [e.g. 1]. However, for investigation of microstructure the scan of significant part of reciprocal space is necessary. The method of reciprocal space mapping and Rietveldtype refinement of the maps was developed and tested on strongly textured TiB<sub>2</sub> coatings deposited on steel substrates. The maps were measured with modified conventional two-axis goniometer in parallel beam arrangement and some measurements were also performed with Eulerian cradle and polycapillary. The method is particularly useful for simultaneous analysis of stress and texture especially in non-cubic materials. It could also be used for the estimation of other parameters like film thickness, microstrain and domain size. Both the extreme elastic models (Voigt/Reuss) have been adopted for the case of fibre texture, often present in thin films. Residual stress could be estimated even for the strongest 001-texture with angular halfwidth of a few degrees. In the maps, the presence of stress is indicated by the inclination of elliptical spots. Expected increase of the residual compressive stress with substrate bias was observed and analyzed.

[1] Kužel R. Jr., Černý R., Valvoda V., Blomberg M., Merisalo M., *Thin Solid Films*, 1994, **247**, 64-78.

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