

## **PROBING THIN-LAYERED AND NANO-STRUCTURED MATERIALS – X-RAY SCATTERING TOOLS**

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Advanced thin-layered and nano-structured materials are essential for today's and future electronic, optical, mechanical and energy devices. The necessary scaling of the applied structures challenges the thin film deposition and patterning processes as well as the measurement and monitoring tools. A detailed knowledge of the material properties is important for its application and crucial for further development and improvements. Typical materials involved are semiconductors, metal alloys, dielectrics and also polymers.

X-ray techniques provide great potential not only in the research and development phase, but also offer unique options for process development and monitoring. X-ray fluorescence, X-ray diffraction and X-ray reflectivity have been successively used for elemental and structural analysis. From X-ray scattering data information is extracted to identify and quantify phases, to determine composition and strain profiles, thickness, roughness, density, grain size, residual stress and preferred orientation.

This presentation will give an overview on the experimental aspects, including recent hardware developments and evaluation processes of X-ray methods. A range of examples of technologically relevant materials will be used to demonstrate the high potential of X-ray techniques.