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Domain Structures in AlScN Thin Films

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Thin films of Aluminium-Scandium Nitride (AlScN) are used as central components in magnetoelectric surface-acoustic wave sensors utilized extensively within the Collaborative Research Center 1261 “Biomagnetic Sensing”.
High resolution XRD experiments were conducted at microfocus beamline P10 at PETRA III. Bragg diffraction on AlScN thin films grown on GaN was investigated at the [0 0 0 2] and [0 0 0 4] reflections.
The material surface exhibits a domain structure on the nm scale, which can be associated with ferroelectric domains. In addition, an unexpected second lateral domain structure on the µm scale is observed, which is attributed either to Scandium-rich and Scandium-depleted regions or large ferroelectric domains.
Additional synchrotron experiments are in planning to further investigate AlScN, e.g. grazing incidence diffraction or absorption measurements around the Scandium K-edge.

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