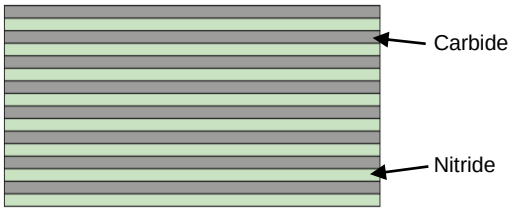
Bachelor/Master Thesis

Projektarbeit

Transition metal carbides belong to ultra-high temperature ceramics (UHTC) and are particularly valued for their high thermal and mechanical stability as well as melting points that can reach even above 4000 °C. However, a considerable limitation of these materials is their high inherent brittleness. Inspired by the success of nanolayered superlattice architecture—shown to enhance both hardness and toughness of transition metal nitrides, e.g. TiN/CrN or TiN/WN—we are aiming to develop superlattice films to showcase that the same concept is also valid within the family of carbonitride superlattices. The material selection is motivated by ab inito density functional theory calculations. The coatings are prepared via DC magnetron sputtering using the respective ceramic targets. Their characterization includes scanning electron microscopy (SEM), X-ray diffraction (XRD), energy dispersive X-ray spectroscopy (EDS), elastic recoil detection analysis (ERDA), nanoindentation, and fracture toughness testing.



Superlattice

Field: Thin Film Materials Science

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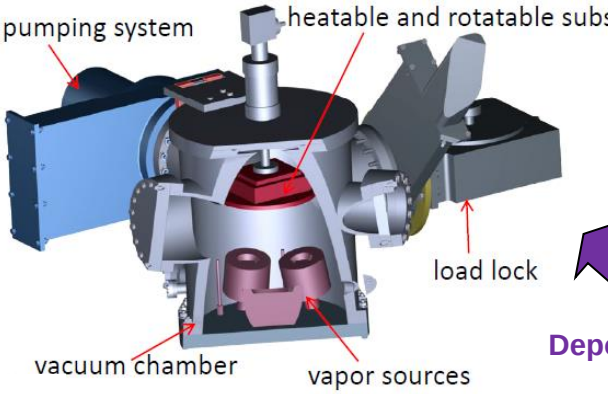
Earliest starting date is June 2022.



Deposition System