

thinfilms and NEW IDEAS for SRF

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Surface Characterization of NbTiN multilayer films for accelerator applications

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Further enhancement of superconducting accelerating cavity performance calls upon the development of materials beyond bulk niobium (Nb). Superconducting RF (SRF) is a surface phenomenon; for most superconducting materials the RF penetration depth is in the range of hundreds of nanometers. Due to the field penetration enhancement occurring in films with a thickness smaller than their nominal penetration depth, multilayer superconductor/insulator/superconductor (SIS) structures are theorized to have potential to support surface magnetic fields beyond the reach of the current SRF cavities. A candidate superconductor for SIS structures is the ternary compound NbTiN. SIS structures based on NbTiN and AlN are currently under development at JLab. NbTiN can be deposited with nominal superconducting parameters using DC reactive magnetron sputtering. This contribution presents the characterization of surface, material and superconducting properties of NbTiN films and SIS structures.

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