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Magnesium diboride coated bulk niobium: a new approach to higher acceleration gradient LEONARDO CIVALE, Los Alamos National Laboratory, TENG TAN, M WOLAK, XIAOXING XI, Department of Physics, Temple University, TSUYOSHI TAJIMA, Los Alamos National Laboratory — Bulk niobium Superconducting Radio-Frequency cavities are a leading accelerator technology. Their performance is limited by the cavity loss and maximum acceleration gradient, which are negatively affected by vortex penetration into the superconductor when the peak magnetic field at the cavity wall surface exceeds the vortex penetration field (H_{vp}). It has been proposed that coating the inner wall of an SRF cavity with superconducting thin films increases H_{vp}. In this work, we utilized Nb ellipsoids to simulate an inverse SRF cavity and investigate the effect of coating it with magnesium diboride layer on the vortex penetration field. A significant enhancement of H_{vp} was observed. At 2.8 K, H_{vp} increased from 2100 Oe for an uncoated Nb ellipsoid to 2700 Oe for a Nb ellipsoid coated with $\sim$ 200 nm thick MgB_2 thin film. This finding creates a new route towards achieving higher acceleration gradient in SRF cavity accelerator beyond the theoretical limit of bulk Nb.

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