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Evaluations of MgB_2 Coatings on 2" Copper Discs for Superconducting Radio Frequency Applications. WENURA WITHANAGE, TENG TAN, NAMHOON LEE, HUTA BANJADE, Temple University, GRIGORY EREMEEV, Thomas Jefferson National Accelerator Facility, PAUL WELANDER, SLAC National Accelerator Laboratory, ANNE-MARIE VALENTE-FELICIANO, Thomas Jefferson National Accelerator Facility, ROBERT KUSTOM, Argonne National Laboratory, MATTHUS WOLAK, Temple University, ALIREZA NASSIRI, Argonne National Laboratory, XIAOXING XI, Temple University — We propose that coating the inner walls of copper RF cavities with superconducting MgB_2 (T_c = 39 K) can result in a viable alternative to the already established niobium-based SRF technology. This approach improves the thermal conductivity, allows for operation at higher temperatures, and reduces the need for large helium refrigeration, thereby resulting in lower operational costs. For our studies, we grew MgB_2 films via hybrid physical chemical vapor deposition (HPCVD) on 2" Cu substrates. Since Mg and Cu readily form an alloy at higher temperatures, the HPCVD setup was modified in order to achieve lower deposition temperatures, minimize alloy formation, and provide high quality MgB_2 films. This method yielded MgB_2 coatings on 2" Cu discs with transition temperatures around 38 K. The samples were characterized with regards to their RF attributes and showed similar performance in comparison to Nb reference samples. The presented results show that MgB_2 coated copper can be a suitable alternative for use in SRF cavities.

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