

HTS for High-Power RF Applications

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Abstract—Niobium-based materials have been extremely useful for superconducting RF technology but require low temperature operation. High-Temperature Superconductors (HTS) in the form of Coated Conductors (CCs) soldered to suitable substrates have already proven their potential for selected applications (RF cavities for axion dark-matter detection, beam coupling impedance control for colliders). This work aims to determine the high-power RF performance of HTS at X-band (11.424 GHz). We have tested several types of REBCO HTS materials, such as films deposited by electron-beam physical vapor deposition, CCs soldered to a copper substrate, and solid pucks formed from powder. RF testing was done via a hemispherical TE mode cavity that maximizes the magnetic field and minimizes the electric field on a 2-inch sample region. We report on first HTS measurements at low and high power, and will discuss future experimental plans and strategies, and potential short- and long-term applications.

Keywords (Index Terms)—Coated Conductors, Microwave Device, RF, Sustainable Development Goals

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