Magnesium Diboride Flexible Flat Cables for Cryogenic Electronics

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Abstract - Magnesium diboride (MgB_2) thin films are a potential alternative to low-temperature superconductors (LTS) due to a higher critical temperature (T_c) of approximately 39 K. The reactive evaporation deposition technique also affords relatively simple growth of MgB_2 films on flexible substrates compared to high-temperature superconductors (HTS). We have designed and fabricated a cable architecture consisting of MgB_2 traces on flexible yttria-stabilized zirconia (YSZ) compatible with commercially available connectors or direct wirebonds. Key performance metrics such as critical current density (J_c) and T_c are measured and compared. We discuss thermal conductivity and passivation schemes for these cables.

Index Terms - Cryogenic electronics, interconnections, MgB_2, superconducting devices, superconducting thin films.

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