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Probing the Superconducting Gaps of Carbon Substituted MgB2 Films using SIS Tunnel Junctions TOM HEITMANN, MARK RZCHOWSKI, Physics Department and the Applied Superconductivity Center, University of Wisconsin-Madison, Madison, WI 53706, PASQUALE ORGIANI, XIAOXING XI, Department of Physics, Department of Materials Science and Engineering, and the Materials Institute, Pennsylvania State University, University Park PA, DEREK WILKE, DOUGLAS FINNEMORE, PAUL CANFIELD, Ames Laboratory, U.S. Department of Energy and Department of Physics and Astronomy, Iowa State University, Ames, IA 50011 — We report scanning tunneling spectroscopy of superconducting-insulating-superconducting (SIS) tunnel junctions consisting of a polycrystalline MgB_2 micro-wire as the probe tip and a series of C-substituted thin films as samples. The MgB_2 micro-wire is affixed to a 250μm Pt-Ir wire and approached to each C-substituted film using an Oxford CryoSXM in STM mode. We are then able to scan over the film surface and probe different areas of the film locally using this SIS configuration. The micro-wire tip, for which we have previously characterized the gaps, is used as a reference for the C-substituted films and to enhance energy resolution by pushing the spectral features to higher energies. The films were grown by hybrid physical-chemical vapor deposition and extensive magnetic and structural characterization of identical films have been reported previously. We investigate the evolution of Δ_π and Δ_σ with carbon substitution and correlate these results with T_C and H_{C2} results.

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