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Fabrication and characterization of Metal/ native oxide barrier /MgB2 junctions JIHOON KIM, Arizona State University, R. GANDIKOTA, Arizona State University, R. SINGH, Arizona State University, N. NEWMAN, Arizona State University, J. ROWELL, DEPARTMENT OF CHEMICAL AND MATERIALS TEAM — Using MBE growth and thermal oxidation in air, we have fabricated cross-bridge junction structures to study the properties of MgB_2 tunneling. We have measured near-ideal tunneling characteristics from normal metal/native oxide barrier/MgB_2 structures. Superconducting energy gaps and DOS for MgB_2 have been inferred from tunneling conductance measurements. We can accurately fit our experimental quasi-particle density of states using a single Dynes function with a value of 2.2meV for the superconducting gap energy and 0.43meV for the thermal broadening energy in MgB_2 electrode. A potential height and barrier thickness of 0.16 eV and 4.6 nm, respectively, have also been inferred from conductance measurements at high voltage. These results suggest the possibility of using the MgB_2 native oxide layer as a barrier layer for the fabrication of practical SIS junctions. This research is supported by the ONR under contract number N00014-02-0002.

Jihoon Kim
Arizona State University

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