

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

MgB₂ Tunnel Junctions with Native or Thermal Oxide Barriers RAGHURAM GANDIKOTA, RAKESH SINGH, YI SHEN, NATHAN NEWMAN, JOHN ROWELL, Arizona State University, ARIZONA STATE UNIVERSITY TEAM — MgB₂tunnel junctions (MgB₂/barrier/MgB₂) were fabricated using oxides of Mg and stoichiometric MgB₂, as the tunnel barrier. The sum of the superconducting gaps (π -gap) observed in conductance-voltage (G-V) measurements was as high as 4.3mV at 4.2 K and a finite value was found for temperatures above 30K. The G-V data exhibit smeared BCS densities of states, indicative of a degraded layer at the electrode/barrier interface. The presence of such an interface might also explain the lack of supercurrents above 20K in junctions exhibiting gap structures above 30K and even in shorted junctions. A subgap current was also observed and was not found to strongly depend on the oxide stoichiometry.

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Date submitted: 03 Dec 2006

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