Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Superconducting energy gap features of MgB_2 thin films on different substrates and orientations WENQING DAI, QI LI, Department of Physics, The Pennsylvania State University, University Park, PA 16802, KE CHEN, XIAOXING XI, Department of Physics, Temple University, Philadelphia, PA 19122 — We report a detailed study of tunneling spectra of MgB_2/I/Pb planar junctions with MgB_2 films on various substrates and of various doping levels. Planar trilayer junctions were fabricated using MgB_2 films with native oxide barrier grown by the Hybrid Physical-Chemical Vapor Deposition technique. Both π and σ bands contribute to the tunneling spectra of tilted-axis films on MgO (211) substrate and mainly π band was observed on c-axis MgB_2 films on SiC (0001), MgO (111) and c-sapphire substrates. We observed σ gap value of $\sim$7.9 meV in MgB_2 films on SiC substrates which display higher T_c due to the lattice strain. This is larger than 7.4 meV on unstrained substrates. However, the π gap value of all samples is $\sim$2.3 meV. We concluded that the strain in MgB_2 films on SiC substrates mainly affects the σ band of MgB_2. In addition, small amount of nitrogen gas was added during film growth to introduce more scattering in MgB_2 films. We systematically studied the change of two gaps with nitrogen doping from the tunneling spectra of MgB2/I/Pb junctions.

Wenqing Dai
Dept of Physics, The Pennsylvania State University,
University Park, PA 16802

Date submitted: 27 Nov 2010 Electronic form version 1.4