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Tunneling study of two-band superconductivity in MgB_2[1] KE CHEN, CHENGGANG ZHUANG[2], YI CUI, QI LI, XIAOXING XI[3], Department of Physics, The Pennsylvania State University, University Park, Pennsylvania, USA, ZI-KUI LIU, Department of Materials Science and Engineering, The Pennsylvania State University, University Park, Pennsylvania, USA — Thin film Pb/barrier/MgB_2 sandwich-type tunnel junctions have been fabricated. The MgB_2 films were epitaxially grown on (211) MgO substrates with c-axis tilted by 19.5 degrees with respect to the substrate normal by hybrid physical-chemical vapor deposition. Tunneling from both σ and π bands of MgB_2 to Pb is observed from the current-voltage characteristics (CVCs). The temperature dependence and the magnetic field dependence of the two gaps were obtained by fitting the CVCs in the framework of two band superconductivity. It shows that at zero temperature and zero field, $\Delta_\sigma \approx 2.3$ mV and $\Delta_\pi \approx 7.4$ mV. As the applied magnetic field normal to the substrate increases, the contribution from the π gap is suppressed much more quickly than the σ gap, which is in agreement with lower critical field corresponding to the π gap.

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