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Momentum-dependent multiple gaps of MgB_2 probed by electron tunneling spectroscopy on MgB_2/native oxide/Pb junctions[1] KE CHEN, Temple University, WENQING DAI, QI LI, The Pennsylvania State University, X.X. XI, Temple University — Distinct multi-band superconductivity is a unique feature that distinguishes MgB_2 from all other phonon-mediated Bardeen-Cooper-Schrieffer (BCS) superconductors. According to a first-principles calculation employing an anisotropic Eliashberg formalism [Choi *et al.* Nature 418, 758 (2002)], there is a distribution of superconducting energy gap values on the Fermi surface of MgB_2 (two σ bands and two π bands). However, only two distinct gaps have been observed experimentally, leading to the suggestion that consideration of the fully anisotropic electron-phonon interaction may not be necessary for real MgB_2 samples. Here, we present an electron tunneling spectroscopy study on MgB_2/native oxide/Pb junctions that clearly shows the distribution of energy gaps. By deconvoluting the tunneling spectrum based on the density of state of Pb, we derive the momentum-dependent energy gaps of MgB_2, which are in good agreement with the anisotropic Eliashberg calculation. The result affirms the importance of the anisotropic electron-phonon interaction in MgB_2 as well as its important impact on device applications.

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