

ARPES STUDIES OF MULTIPLE SUPERCONDUCTING GAPS IN MgB₂

*S. Souma*¹, *Y. Machida*², *T. Sato*¹, *H. Matsui*¹, *T. Takahashi*¹,
*S.-C. Wang*³, *H. Ding*³, *A. Kaminski*⁴, *J. C. Campuzano*⁵, *S. Sasaki*², and *K. Kadowaki*⁶

¹ *Dept. of Physics, Tohoku University, Sendai, Japan 980-8578*

² *Materials and Structures Laboratory, Tokyo Inst. of Tech., Yokohama, Japan 226-8503*

³ *Dept. of Physics, Boston College, Chestnut Hill, MA 02467*

⁴ *Dept. of Physics and Astronomy, Iowa State University, Ames, IA 50011*

⁵ *Dept. of Physics, University of Illinois at Chicago, Chicago, IL 02467*

⁶ *Inst. of Materials Science, University of Tsukuba, Tsukuba, Japan 305-8573*

High-resolution angle-resolved photoemission spectroscopy has been carried out to clarify the anomalous superconductivity of MgB₂ [1,2]. We observed three bands crossing the Fermi level, which are ascribed to B2p σ , π and surface bands. We have succeeded for the first time in directly observing the superconducting gaps of these bands separately. Figure shows temperature dependence of ARPES spectra in the vicinity of Fermi level at each Fermi vectors of σ , π , and surface bands as shown inset, taken at 28 eV photon at 17/45 K (below/above T_c). We have found that the superconducting-gap sizes of σ and surface bands are 6.5 ± 0.5 and 6.0 ± 0.5 meV, respectively, while that of the π band is much smaller (1.5 ± 0.5 meV). The present experimental result unambiguously demonstrates the validity of the two-band superconductivity in MgB₂ [3,4].

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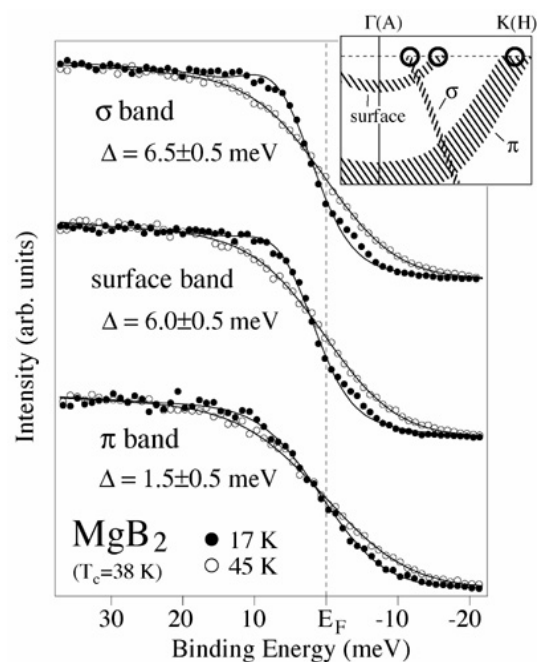


Figure: Temperature dependence of ARPES spectra of MgB₂ below/above T_c (15/45 K, filled/open circles). Inset shows schematic band structure. Solid lines on the spectra show the results of numerical fitting.

References:

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