

Abstract Submitted  
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**Novel phase line in the mixed state of the multi-band MgB<sub>2</sub> single crystal**<sup>1</sup> DAICHI KUBOTA, TAKEKAZU ISHIDA, Osaka Pref. Univ. (Sakai) — High-quality MgB<sub>2</sub> single crystals of submillimeter size were synthesized successfully by the vapor transport method for carrying out magnetic torque measurements. The magnetic torque of MgB<sub>2</sub> has been analyzed by a single-band model as well as a multi-band model for an anisotropic superconductor. The anisotropy in the coherence length  $\gamma_\xi = \xi_a/\xi_c$  and the anisotropy in the penetration depth  $\gamma_\lambda = \lambda_c/\lambda_a$  with the multi-band Kogan theory for the magnetic torque were simultaneously determined by means of the least-squares fittings. A systematic variation of two-sorts of effective superconducting anisotropies,  $\gamma_\xi$  and  $\gamma_\lambda$ , in the field-temperature plane was obtained as contours, and can be interpreted as a manifestation of the two-band nature of the MgB<sub>2</sub> superconductivity. It is not a gradual crossover but a drastic change in the electronic state that an MgB<sub>2</sub> superconductor transits from a  $\pi - \sigma$  multiband superconductor in lower fields to a  $\sigma$  single band superconductor in higher fields.

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Daichi Kubota  
Osaka Pref. Univ. (Sakai)

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