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Effect of Al doping on the upper critical field of MgB_2 single crystals SUNG-IK LEE, BYEONGWON KANG, HEON-JUNG KIM, HYUN-SOOK LEE, Pohang University of Science and Technology, Pohang, Korea, THOMAS DAHM, Universität Tübingen, Institut für Theoretische Physik,Germany, THOMAS DAHM COLLABORATION — We use magnetization measurements to investigate the effect of Al substitution on the temperature dependence of the upper critical field, $H_{c2}(T)$, of MgB_2 single crystals. We find that as the Al concentration is increased, the shape of $H_{c2}(T)$ changes from that for dirty σ bands to that for dirty π bands, which verifies that Al doping enhances intraband scattering mainly in the π bands. Thus, one of the characteristics of the two-gap nature of MgB_2, i.e., the strong temperature dependence of the $H_{c2}(T)$ anisotropy $\gamma_H = H_{c2}^{ab}/H_{c2}^{c}$ in pure MgB_2, is drastically affected by Al doping.

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