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Comprehensive Characterization of Superconductivity in Co-doped BaFe₂As₂¹ TSUYOSHI TAMEGAI, YASUYUKI NAKAJIMA, TOSHIHIRO TAEN, Dep. of Appl. Physics, The University of Tokyo — We have grown high-quality single crystals of Ba(Fe_{1-x}Co_x)₂As₂ by self-flux method. Superconducting properties of these single crystals are characterized by measuring magnetization, resistivity, upper critical field, Hall coefficient, and magneto-optical images. A sharp drop of susceptibility is observed around 24 K for $x=0.1$. Irreversible magnetization shows fish-tail feature in a wide temperature range, indicating the presence of inhomogeneities in the crystal. The critical current density J_c for $x=0.1$ is over 10^5 A/cm² at low temperatures up to 50 kOe. Upper critical field determined by resistive transition is anisotropic with anisotropic parameter ~ 3.5 . Hall effect measurements indicate that Ba(Fe_{1-x}Co_x)₂As₂ is a multiband system with a dominant conduction by electron. Magneto-optical image for $x=0.1$ at 25 K reveals the presence of trapped vortices in a part of the crystal, which leads us to expect that bulk superconductivity above 25 K can be realized by fine tuning the Co-doping level.

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