

Abstract Submitted
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Effect of Heavy-ion Irradiation in Co-doped BaFe₂As₂¹ TSUYOSHI TAMEGAI, YASUYUKI NAKAJIMA, YUJI TSUCHIYA, TOSHIHIRO TAEN, HIDENORI YAGYUDA, Department of Applied Physics, The University of Tokyo, SATORU OKAYASU, Advanced Science Research Center, Japan Atomic Energy Agency, MASATO SASASE, The Wakasa-wan Energy Research Center, HISASHI KITAMURA, TAKESHI MURAKAMI, Radiation Measurement Research Section, National Institute of Radiological Sciences — The critical current density, J_c , at low temperatures and fields reaches 1×10^6 A/cm² in the optimally doped Ba(Fe_{1-x}Co_x)₂As₂ with $T_c \sim 24$ K. In order to further improve the current carrying capability, we have irradiated swift heavy-ions into Ba(Fe_{1-x}Co_x)₂As₂. Even with the same ion species and energy as those formed columnar defects in cuprate superconductors, columnar defects are not always created. By irradiating heavier ions like Au and Xe, we have successfully confirmed the creation of columnar defects and resulting enhancement of J_c . up to 5×10^6 A/cm² in the case of Au irradiation with a matching field of 20 kG. High-resolution TEM observations reveal the presence of discontinuous columnar defects with diameters of 2-5 nm, which are much smaller than those in cuprate superconductors. Interestingly, the lattice image is sustained in the defect region in contrast to amorphous formation in cuprates. Vortex dynamics in pristine and irradiated Ba(Fe_{1-x}Co_x)₂As₂ will also be discussed.

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