

Vortex Phase Diagram of Pristine and Irradiated Co-doped BaFe₂As₂

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Vortex phase diagram is studied up to $H = 170$ kOe in pristine and Xe (800 MeV, $B_{\Phi} = 20$ kOe) irradiated Ba(Fe_{0.925}Co_{0.075})₂As₂ single crystals. In both samples, temperature dependence of resistivity (ρ) and current(I)-voltage(V) characteristics are carefully measured by using a picovoltmeter. Critical exponents in the pristine sample show little magnetic field dependence unlike the case for SmFeAsO_{0.85} crystal¹. Rather, it is similar to the case of YBa₂Cu₃O_{7- δ} single crystals. In the irradiated sample, both vortex glass and Bose glass scalings give reasonable scalings of I - V curves. It may imply that the defects introduced by 800 MeV Xe irradiation are not columnar defects, which is supported by TEM observations and weaker angular dependence of resistivity under magnetic field. Vortex glass transitions determined by both ρ - T and I - V measurements agree reasonably well. Vortex glass region in Xe irradiated sample is narrower compared with that in a pristine sample, especially at lower fields.

¹H.-S. Lee, M. Bartkowiak, J. S. Kim, and H.-J. Lee, Phys. Rev. B **82**, 104523 (2010).