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# In-plane electronic anisotropy in the optical spectra of Ba(Fe1-xCox)2As2

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The magnetostructural phase in undoped and underdoped iron-arsenide superconductors attracts much interest as the proximate phase to the superconducting phase. In this phase, both the crystal structure and the spin arrangement break the fourfold rotational symmetry, and various experimental techniques have successfully probed the in-plane anisotropy.

We measured the optical spectrum of detwinned Ba(Fe1-xCox)2As2 (x=0, 0.02, and 0.04) using the polarized light along the crystallographic a and b axis in the orthorhombic phase. In the present work, the annealed crystals of high quality were used [1]. For x=0, in the low-temperature orthorhombic-antiferromagnetic phase, the isotropic Drude term dominates the low-energy optical conductivity spectrum, consistent with the resistivity data. Intrinsic anisotropy shows up in the higher-energy region [2]. With Co doping, the anisotropy in the high-energy region weakens, whereas the width of the Drude component contributing to the dc conductivity becomes anisotropic. This anisotropy well explains the anisotropy in the resistivity. Our results show that an anisotropic scattering rate gives rise to the dc conductivity anisotropy, suggesting that the dopant Co atom works as an anisotropic scattering center.

[1] S. Ishida et al., Phys. Rev. B 84, 184514 (2011).
[2] M. Nakajima et al., Proc. Natl. Acad. Sci. U.S.A. 108, 12238 (2011).

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