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Anomalous Hall effect in $Y_2Fe_{17-x}Co_x$ single crystals JOLANTA STANKIEWICZ, ICMA, CSIC-Universidad de Zaragoza, KONSTANTIN SKOKOV, Tver State University — We study experimentally the Hall resistivity of $Y_2Fe_{17-x}Co_x$ single crystals ($x \leq 8$) for wide temperature and applied magnetic field ranges, and for various magnetic field orientations with respect to the easy-magnetization axis. We find a large anomalous Hall effect (AHE) anisotropy in this system for $x \leq 2$. The AHE resistivity ρ_{xy}, measured with an applied magnetic field $H \perp c$-axis, is nearly one order of magnitude larger than the one for H along the hard magnetization direction ($H \parallel c$-axis). Furthermore, the former is very large and varies linearly with the longitudinal resistivity ρ, whereas the latter follows ρ^2 for $T < 150$ K. We tentatively interpret the behavior of ρ_{xy} for $H \parallel c$-axis in terms of an intrinsic effect related to the inter-orbital hopping between degenerate d-orbitals. Such hopping is allowed for high symmetry points at the crystallographic dumb-bell sites in this configuration. On the other hand, there is no inter-orbital hopping for $H \perp c$-axis. However, a huge amplitude of the AHE resistivity for this configuration, which follows from skew scattering, is puzzling. Both the AHE anisotropy and the large skew scattering go away as more Fe is substituted by Co. We attribute this to variations in the electronic structure of the $Y_2Fe_{17-x}Co_x$ system when Co atoms start to occupy the dumb-bell crystallographic sites.

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