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Structure and Magnetotransport Properties of High-T_C Ferromagnetic Semiconductors, (Ba,Sr)$M_{2\pm x}$Ru$_{4\pm x}$O$_{11}$ with M = Mn, Fe, Co[1] LARYSA SHLYK, University of Kentucky, RAINER NIEWA, BARBARA SCHUEPP-NIEWA, Technical University of Munich, LANCE DE LONG, University of Kentucky — We have grown single crystals of R-type ferrites, (Ba,Sr)$M_{2\pm x}$Ru$_{4\pm x}$O$_{11}$ (M = Mn, Fe, Co), with compositions determined from X-ray refinements and microprobe analysis. The hexagonal crystal structure ($P6_3/mmc$, Z = 2) consists of (001) layers of edge-sharing (M,Ru)O_6 octahedra connected within [001] by face-sharing pairs of (M,Ru)$_2O_9$ octahedra and MO_5trigonal bipyramids. A significant homogeneity range is generated by variable occupation of octahedral sites by 3d and 4d elements. These compounds are soft ferromagnetic semiconductors with T_C's that can substantially exceed room-temperature, depending on composition. The temperature-dependent, in-plane (current parallel to **ab-**plane) resistivity of $SrFe_{2.51}Ru_{3.42}Al_{0.07}O_{11}$ indicates semiconductivity, and exhibits activated behavior with narrow gap of $\Delta \approx 30$ meV for T >180 K. Hall measurements show the predominant charge carriers are holes; our results suggest these materials are promising for spintronic devices.

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