Composition dependence of magnetic order and spin chirality of Kagomé lattices in BaMn$_{1+x}$Ru$_{5-x}$O$_{11}$ R-type ferrites$^1$ JUSTIN WOODS, GANG CAO, SEAN PARKIN, ERIC TEIPEL, LANCE DELONG, University of Kentucky — The effects of atomic disorder on magnetic frustration have not been extensively studied. Single-crystal BaMn$_{2.49}$Ru$_{3.51}$O$_{11}$ exhibits three closely-spaced anomalies in the magnetization at temperatures $T_1 = 183$ K, $T_2 = 171$ K and $T_3 = 128$ K, signaling complex magnetic/chiral ordering, due to an interplay between antiferromagnetic correlations, magnetic frustration and non-zero scalar chirality (induced by spin canting) within the hexagonal (Kagomé) ab-plane [1]. We observe that small increases in Ru content change the temperature and nature of the anomalies: A single crystal of composition BaMn$_{1.915}$Ru$_{4.085}$O$_{11}$ exhibits anomalies shifted to lower temperatures $T_1 = 149$ K, $T_2 = 90$ K and $T_3 = 48$ K. The anomaly at $T_3$ is rapidly weakened by fields $H > 25$ Oe applied parallel to the Kagomé plane for both compositions studied; whereas further field increases shift the onset of magnetic order substantially upward to $T_1 = 175$ K for the higher Ru concentration.


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