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MAGNETISM IN NOVEL FAMILY OF TRIANGULAR LAYERED ANTIMONATES MSB_2O_6 (M=MN, CO, NI, CU)

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Magnetic and thermodynamic properties of four new metastable trigonal layered MSb_2O_6 phases (M =Mn, Co, Ni, Cu) were investigated. All compounds have been prepared by the low-temperature ion-exchange reactions. Except $CuSb_2O_6$, all compounds under study demonstrate a long-range antiferromagnetic order at low temperatures with Neel temperatures ~8 K (Mn), ~11 K (Co) and ~15 K (Ni) respectively. In addition, the magnetization isotherms indicate a magnetic field induced spin-reorientation (spin-flop type) transition below TN at BSF ~ 0.8 T for $MnSb_2O_6$ and BSF ~ 8 T for $CoSb_2O_6$ respectively, implying two different spin-configurations in the ordered phases. It is interesting to note that the magnetic properties observed here for these novel compounds possessing the trigonal layered rosiaite-type structure are essentially different from those reported for their stable polymorphs MSb_2O_6 (M=Ni, Co, Cu) with tetragonal trirutile-type structure. Magnetic behavior of all trirutile-type compounds MSb_2O_6 (M=Ni, Co, Cu) is quite similar. A characteristic feature is the presence of a wide temperature range where all MSb_2O_6 with trirutile structure exhibit short-range antiferromagnetic order and the temperature dependence of the magnetic susceptibility x(T) demonstrates clear low-dimensional broad maximum at T_{max} followed by long-range antiferromagnetic order. Despite the nearly perfect 2D square M^{2+} sublattice the data were well described within the formalism of antiferromagnetic 1D spin chain. In contrast, new metastable MSb_2O_6 phases (M=Mn, Co, Ni, Cu) did not show any sign of low-dimensional behavior and the magnetic susceptibility nicely follows the Curie-Weiss law over the wide temperature range higher T_N. The negative values of Curie-Weiss temperature indicate predominance of the antiferromagnetic interactions and moderate frustration for the 2D triangular M^{2+} magnetic sublattice.

BIOGRAPHY

Grigory Raganyan has completed his Bachelor and Magister degree from Moscow State University, Russia. Currently, he is pursuing PhD student of Moscow State University. He is co-author of three articles from journals with impact factor more than three. His scientific interests include strongly correlated electron systems, low dimensional magnetism. His Research activities are related to the fundamental characterization of static, dynamic and resonant physical properties of the new complex oxides.

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