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*Structural and magnetic investigations of new skyrmion phases*

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Recent studies report the existence of skyrmions in materials with a different chiral space group from that of the B20 compounds, such as GaV4S8 [1] and Co10-xZn10-yMnx+y [2]. This has motivated us to embark upon a study of several classes of skyrmion materials and explore the existence of the skyrmion phase in a wide composition range of each of the above family of compounds: i.e., GaV4X8 (X=S, Se, Te), Co10-xZn10-yMnx+y and the Cu2-xAxOSeO3 (A=Zn, Ni).
GaV4S8 crystallizes in a lacunar spinel non-centrosymmetric cubic F-43m structure at room temperature and orders ferromagnetically below Tc=13 K below which it has a rather puzzling magnetic phase diagram. A skyrmion state has been suggested to appear when a very small magnetic field (10-100 mT) is applied in the temperature range 8 to 13 K [1]. Co10-xZn10-yMnx+y alloys belong to a family of cubic chiral ferromagnets (Tc between 150 to 420 K) that crystallise in the ß-Mn-type structure. A recent study reports on the formation of a skyrmion phase in this system at and above room temperature, under application of a very small magnetic field of 10mT [2]. In the well studied ferrimagnet Cu2OSeO3 (TN=56 K), substitutions at the two different Cu(I) and Cu(II) sites by both magnetic and non-magnetic atoms (Zn, Ni) [3] sheds light on the origin, the formation, and tuning of the skyrmion lattices.
A number of the above materials have been synthesized and structural investigations have been carried out using both powder and single crystal X-ray diffraction. A study of the magnetic properties of these materials has also been carried out by ac and dc magnetic susceptibility measurements. We present a detailed structural and magnetic study of these interesting classes of materials demonstrating the structural similarities of these materials and the correlation with their magnetic properties.
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