

Magnetic skyrmion materials

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Recently, there has been considerable interest in the physics of magnetic skyrmions due to their potential use in spintronic devices. Non-centrosymmetric magnetic systems have been found to host a variety of exotic, and in some cases topologically protected, magnetic states such as skyrmion lattices, bimerons, chiral solitons and helimagnetism to list a few. More recently skyrmions been found and investigated in centrosymmetric intermetallics as well. To make headway in understanding the physics of these skyrmion materials, high quality single crystals are essential. This has motivated us to embark upon a study of several classes of magnetic materials and to explore a wide composition range of each of the family of compounds. The materials investigated range from lacunar spinels, centrosymmetric intermetallics and layered van der Waals materials.

In this talk, I will present an overview of the crystal growth at Warwick of several of the above materials using a variety of techniques. Investigations of the effects of substitution and the resulting structural order/disorder on the existence of the skyrmions and other related spin structures in these crystals sheds light on the origin and the tuning of these lattices, and important structure –property correlations.