Contribution ID : **65** Type : **Poster**

Correlating the effects of non-magnetic doping with structural anomaly in the multiferroic material Cu2OSeO3

Unconventional topological spin structures such as chiral spin systems offer a plethora of fascinating phenomena for fundamental research and future technological applications. Cu2OSeO3 is an insulating multiferroic material that was shown to host skyrmions under specific conditions. It possesses a 3D Kagome lattice of Cu2+ sites, such that a triangular network lattice connects the magnetic ions. Although Kagome lattices are generally associated with hosting frustrated magnetic structures, Cu2OSeO3 lacks any significant frustration due to both ferromagnetic and antiferromagnetic superexchange interactions being present, as satisfied by a 3-up 1-down ferrimagnetic arrangement. The lack of inversion symmetry in the corner shared O-Cu4 tetrahedra that make up the 3D Kagome lattice results in an appreciable Dzyaloshinksii-Moriya interaction between Cu2+ sites; this competes with ferromagnetic/antiferromagnetic interactions leading spin canting that underpins the formation of helical/conical spin textures. While no change in the overall cubic symmetry has been observed alongside the formation of the above magnetic phases, low-temperature powder and single crystal diffraction data (lab, synchrotron and neutron) on pure and Te-doped Cu2OSeO3 indicate an anomalous trend in Cu-Cu bond distances below room temperature. Inverse trends in the Cu(1)-Cu(2) and Cu(1)-Cu(2) distances between the ‘strongly’ and ‘weakly’ interacting O-Cu4 tetrahedra with the distance decreasing and increasing, respectively. This is reminiscent of distortions found in 2D breathing AFM Kagome lattices, which trend towards trimers of magnetic sites sitting on a triangular lattice. The strongest distortion of the Cu-Kagome lattice correlates with the temperature with which the magnetic skyrmions are stable (56 - 58 K).

Level of Expertise

Student

Presenter Gender

Woman

Pronouns

She/Her

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