# Evolving charge density wave and band structure control in topological semimetals LnSbxTe2-x-δ(Ln = Ce, Nd, Gd)

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Materials containing a square net structure offer a rich playground for the discovery of topological semimetals (TSMs), due to the inherently symmetry protected band crossings [1]. Electron counting rules govern the stability of delocalized bonding in the square net, where deviations from the ideal count of 6 e-/atom lead to charge density wave (CDW) distortions in the net, a phenomenon typically associated with the opening of a band gap at the Fermi energy [2]. In GdSbxTe2-x-δ, we have recently reported by ARPES that the CDW selectively gaps topologically trivial states away from the Fermi energy, leaving only the topological band crossing present at the Fermi surface [3]. Herein, we report progress towards understanding the evolution of CDW distortions in LnSbxTe2-x-δ (Ln = Ce, Nd, Gd) and their relationship to the evolving band structure and preservation of topological states. Single crystal x-ray diffraction has been used to solve commensurately and incommensurately modulated phases over the composition space, where similarities and differences of the structures with Ln will be discussed. Finally, the proposed role of modulation on the magnetism in these systems will be discussed[4].

*[1] Klemenz, S.; et. al. Annu. Rev. Mater. Res. 2019, 49 (1), 185–206.*

*[2] Klemenz. S.; et. al.; J. Am. Chem. Soc. 2020, 142 (13), 6350–6359.*

*[3] Lei, S.; et. al. accepted.*

*[4] Singha. R.; et. al. submitted.*

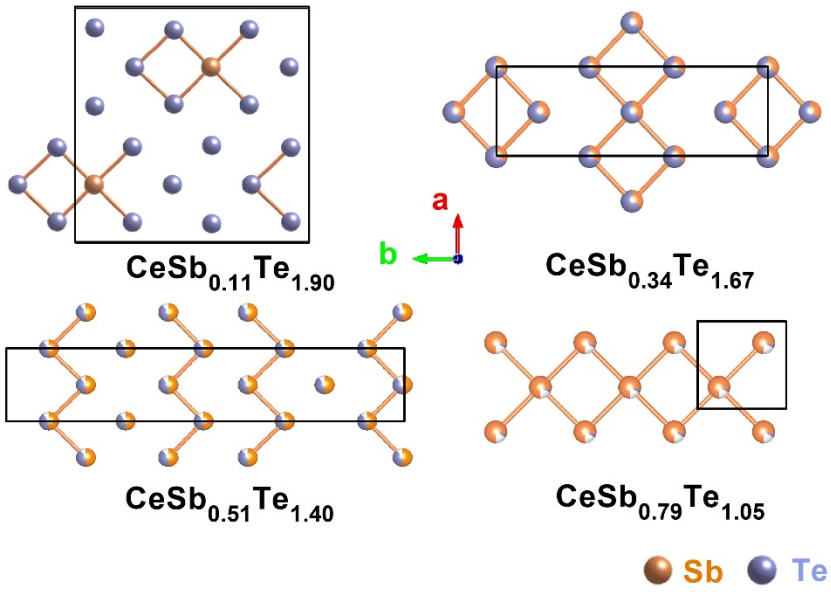


Figure 1