Structural and Electrical Properties of $([SnSe]_{1+\delta})_m(NbSe_2)_1$ Compounds: Single $NbSe_2$ layers separated by increasing thickness of SnSe

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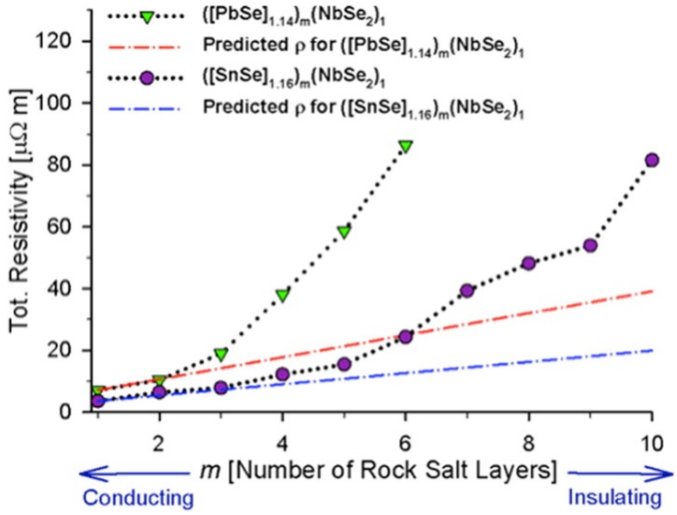
Short Abstract

The compounds $([SnSe]_{1+\delta})_m(NbSe_2)_1$ were prepared from a series of designed pre-cursors, with $NbSe_2$ and SnSe providing metal and semiconducting layers, respectively. The in-plane structure of both parts systematically changes as the thickness of SnSe increases. The electrical resistivity and Hall coefficient increase systematically as a function of *m* stronger than would be expected for non-interacting $NbSe_2$ and SnSe layers. The results suggest the presence of charge transfer between the layers, the extent of which in $([SnSe]_{1+\delta})m(NbSe_2)_1$ can be tuned as a function of SnSe thickness and spans the same range as many other NbX_2 based compounds.



Above. Change in the room temperature resistivity as a function of *m* for the $([SnSe]_{1+\delta})_m(NbSe_2)_1$ compounds studied in this paper compared with those measured for $([PbSe]_{1.14})_m(NbSe_2)_1$. The straight dashed lines show the expected behaviour based on no interactions between a metallic $NbSe_2$ layer and a nonconducting MSe layer.