Structural and electrical properties of a new $([SnSe]_{1.16})_m(NbSe_2)_1$ polytype

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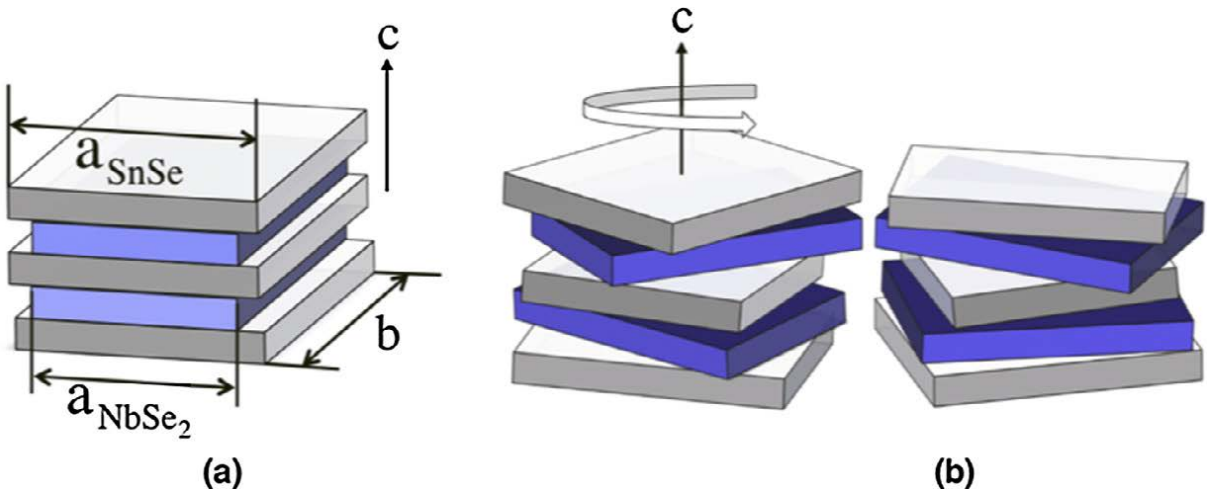
Short Abstract

A new polytype of the misfit layer compound $([SnSe]_{1.16})_1(NbSe_2)_1$ with extensive rotational disorder was prepared from designed modulated elemental reactants. This polytype, previously referred to as a ferecrystal, formed over a range of compositions and precursor thicknesses. The *a*- and *b*-axis in-plane lattice parameters of both the SnSe and $NbSe_2$ constituents were unequal. The ferecrystalline compound is 1.6 times more conductive than the misfit layer compound. Hall effect measurements indicate that the ferecrystal is a *p*-type metal and that the higher conductivity is due to the higher mobility of carriers in the ferecrystalline compound.



Above. A schematic representation of the structure of the $([SnSe]_{1.16})_1(NbSe_2)_1$ misfit layer compound (a) and two grains of the $([SnSe]_{1.16})_1(NbSe_2)_1$ ferecrystal compound (b) illustrating the extensive rotational disorder between the constituent layers.