Synthesis and Systematic Trends in Structure and Electrical Properties of $[(SnSe)_{1.15}]_m(VSe_2)_1$, m = 1, 2, 3, and 4

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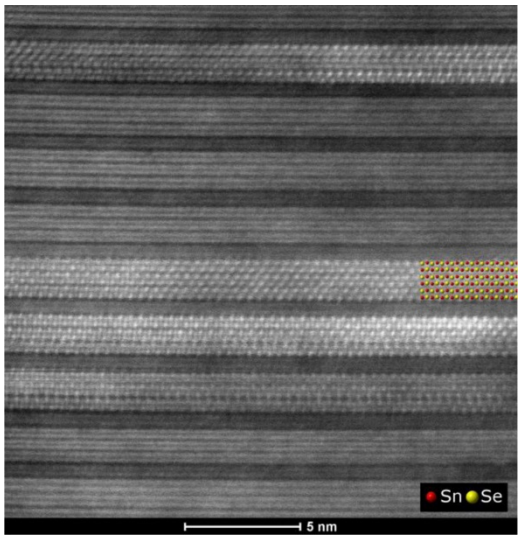
Short Abstract

Four compounds $[(SnSe)_{1.15}]_m(VSe_2)_1$, were synthesised to explore the effect of increasing the distance between Se−V−Se dichalcogenide layers on electrical transport properties. XRD and STEM data revealed that the precursors self-assembled into the desired compounds containing a Se−V−Se dichalcogenide layer precisely separated by a SnSe layer. The average structure of the position of the Sn, Se, and V planes along the *c*-axis is similar to that observed in the STEM images and agrees with density functional theory. Increasing quasi-two-dimensional behaviour is suggested by the increasingly thick layers of SnSe that separate the Se−V−Se layers and by electronic structure calculations.



Above. Representative cross-section STEM-HAADF image of a[(SnSe)1.15]3(VSe2)1 sample. The image clearly contains a brighter set of three bilayers corresponding to the SnSe layers and a darker VSe2 layer. A structural model of SnSe along [010] is inset on the right of the image.