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The electrical and magnetotransport behaviour of layered tetragonal $SrMn_2Ge_2$

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$ThCr_2Si_2$-type (space group: $I4/mmm$) materials have attracted a significant amount of interest in recent years because of the intriguing ground states and structure-property relationships exhibited by them. In particular, the AMn_2Ge_2 (A = alkaline earth metal or rare-earth metal) compounds have been shown to exhibit a wide variety of complex magnetic structures and unusual magnetotransport behaviours. In this work, we present the structural and physical properties of the unexplored compound $SrMn_2Ge_2$ using data obtained from x-ray diffraction, electronic and magnetotransport, thermal, and magnetic measurements. The Sommerfeld coefficient obtained from low-temperature heat capacity data shows a moderately enhanced density of states of 2.9(8) states/(eV f.u.) at the Fermi level in comparison to the values estimated from the band structure calculations. Furthermore, this compound exhibits an anomalously large positive magnetoresistance that approaches ~ 50 % at 2 K and deviates from Kohler's law, instead obeying a power law with an exponent of n = 1.50(8). We discuss and compare our results with those reported for isostructural compound $LaMn_2Ge_2$ which shows similar magnetotransport behaviour.

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