

Abstract Submitted
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Extraordinary two-dimensional charge transport at Co_2YSi ($\text{Y}=\text{Mn,Fe}$)- SrTiO_3 Interface¹ P.K. ROUT, HIMANSHU PANDEY, ANUPAM GULERIA, P.C. JOSHI, Z. HOSSAIN, R.C. BUDHANI², Indian Institute of Technology Kanpur, India — We present extraordinary charge transport in epitaxial thin films of Co_2MnSi and Co_2FeSi grown on SrTiO_3 , which shows remarkably low residual resistivity ($\approx 10^{-7}\Omega\text{cm}$), giant residual resistivity ratio (as high as 1680) and high mobility ($\approx 10^4 \text{ cm}^2\text{V}^{-1}\text{s}^{-1}$). Furthermore, such unusual behavior is not observed in films deposited on other cubic oxide substrates of comparable lattice parameters. The thickness dependent study establishes the presence of an electrically more conducting interfacial layer. We believe that a possible mechanism for the electronic behavior of the interface lies in a significant band bending at the interface in addition to the defects due to redox reaction of energetic particles during film growth. We compare our results with the behavior of recently discovered two dimensional electron gas (2DEG) at $\text{LaAlO}_3/\text{SrTiO}_3$ interface. The strong magnetic character of Heusler alloys combined with their metallicity adds a new dimension to 2DEG problem and makes it potentially important for spintronics applications.

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