Abstract:

We report quasi-two-dimensional (Q2D) itinerant electron magnetism in the layered Co-based shandites. Comprehensive magnetization measurements were performed using single crystals of Co₃Sn₂₋ₓInₓS₂ (0 ≤ x ≤ 2) and Co₃₋₀.₅FeₓSn₂S₂ (0 ≤ y ≤ 0.5). The magnetic parameters of both systems; the Curie temperature TC, effective moment peff and spontaneous moment ps; exhibit almost identical variations against the In- and Fe-concentrations, indicating significance of the electron count on the magnetism in the Co-based shandite. The ferromagnetic-nonmagnetic quantum phase transition is found around xc ≈ 0.8. Analysis based on the extended Q2D spin fluctuation theory clearly reveals the highly Q2D itinerant electron character of the ferromagnetism in the Co-based shandites.

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