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Putative non-trivial topology in YNiSn2 Dirac semimetal

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We report X-ray powder diffraction, elemental analysis, electrical resistivity, magnetic susceptibility, specific heat and angle-resolved photoemission spectroscopy (ARPES) in single crystals of YNiSn2. This compound crystallizes in a orthorhombic crystal structure (space group Cmcm) with lattice parameters a = 4.409 ˚A, b = 16.435 ˚A, c = 4.339 ˚A. YNiSn2 presents a weak Pauli paramagnetic susceptibility $\chi 0 = 2(3)\times 10-5$ emu/mol-Oe and a small electronic heat capacity Sommerfeld coefficient γ = 4 mJ/molK2, consistent to a low-density of states at Fermi level. Interestingly, YNiSn2 presents, at T = 1.8 K a giant positive magnetoresistance (MR) of nearly 1000 % with a quasi-linear field dependent increase up to H = 16 T and a field induced metal-insulator-like crossover at high field. Furthermore, quantum oscillations were observed for particular field orientations. The ARPES experiments reveals interesting features that may be associated with the presence of surface states and Dirac cones in the band structure of the material. This compound could be the first realization of a topological Dirac semimetal evolving a transition metal p and/or d electrons.

Keyword-1

ARPES

Keyword-2

Semimetals

Keyword-3

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