Structural, magnetic and electronic properties of a new silicide MnPtSi

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9.7 cm

Recent results concerning giant exchange-derived magnetoelastic coupling and tricriticallity in the metamagnet MnCoSi (TiNiSi-type structure) [1] as well as intriguing magnetic properties of the isostructural compounds MnTX (T = transition metal element; X = Si, Ge) [2] stimulated the search for consecutive members of this family.
Here, we report on the crystal structure, electronic structure and magnetic properties of the new compound MnPtSi. First principles electronic structure calculations indicate an interesting spin state of Mn with a magnetic moment of $3.2\mu_B$. This finding is in agreement with the saturation magnetisation of $3\mu_B$ in the ordered state. Further, the effective moment derived from high-temperature magnetic susceptibility supports the S≈3/2 spin state of Mn. Thermodynamic measurements revealed two successive magnetic phase transitions at $T_C \approx 340$ K and $T_N \approx 326$ K. The FM to AFM transition is accompanied by a large magneto-volume effect ($\Delta V/V \sim 1.4\%$) and a change in Mn-Mn distances of up to 1%.

[1] Barcza A. *et al.*, Phys. Rev. Lett. (2010) **104** 247202
[2] Eriksson T. *et al.*, Phys. Rev. B (2005) **71** 174420 and references there in

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