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The magnetocaloric effect in PrNiSi_2

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Abstract content
 (Max 300 words)

The magnetocaloric effect (MCE) in lanthanide based compounds has attracted sustained interest ever since the discovery of the so called 'giant' MCE in $\text{Gd}_5\text{Si}_2\text{Ge}_2$ by Pecharsky and Gshneidner [1]. Apart from its applicability in new energy efficient refrigeration technologies, the MCE is also a useful probe into the magnetic properties of a system. Recent research focuses on the interplay between the MCE and the salient features of $4f$ -electron magnetism [2]. In this regard PrNiSi_2 offers an interesting case study. The system orders ferromagnetically below 20K [3,4] contrary to the non-magnetic ground state expected for Pr-ions in a crystalline electric field (CEF) with orthorhombic symmetry [5]. Subsequently a study of the MCE in polycrystalline PrNiSi_2 is presented. An anomalous contribution to the MCE is found above the magnetic phase transition temperature. An explanation of the latter in terms of a strong uniaxial anisotropy resulting from leading terms in the CEF Hamiltonian is forwarded.

[1] V.K. Pecharsky and K.A. Gshneidner, Jr., Physical Review Letters **78** (1997) 4494

[2] N.A. de Oliveira and P.J. von Ranke, Physics Reports **489** (2010) 89

[3] P. Shobinger-Papamantellos and K.H.J. Buschow, Journal of Alloys and Compounds **185** (1992) 51

[4] A. Gil et al., Journal of Magnetism and Magnetic Materials **129** (1994) 271

[5] P. Javorsky et al., Journal of Magnetism and Magnetic Materials **186** (1999) 373

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