

(Tu-P-20) Spinglass behaviour of zinc manganese selenide ($Zn_{1-x}Mn_xSe$) and zinc manganese telluride ($Zn_{1-x}Mn_xTe$) below percolation limit

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(Tu-P-20) SPINGLASS BEHAVIOUR OF $Zn_{1-x}Mn_xSe$ AND
 $Zn_{1-x}Mn_xTe$ BELOW PERCOLATION LIMIT*

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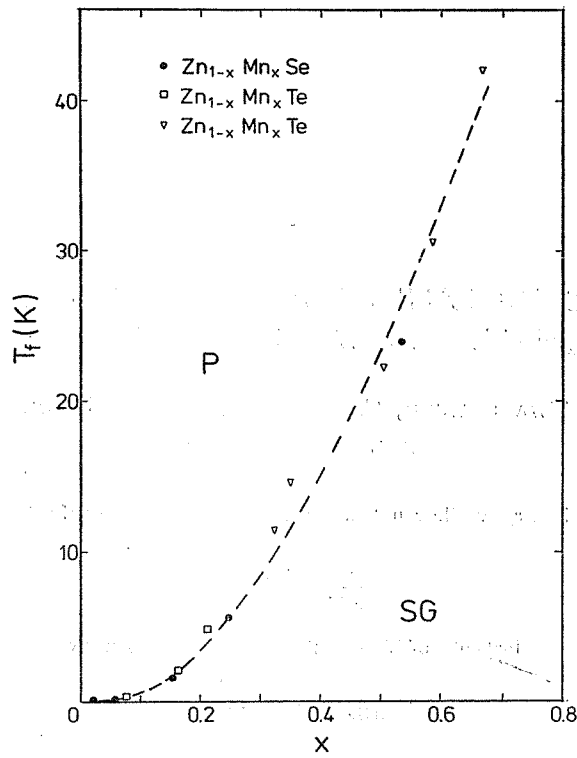
Spinglass phase transition is reported in $Zn_{1-x}Mn_xSe$ and $Zn_{1-x}Mn_xTe$ for x below percolation limit.

PACS numbers: 75.90.+w, 75.40.-s

The magnetic susceptibility of $Zn_{1-x}Mn_xSe$ ($0.02 \leq x \leq 0.53$) and $Zn_{1-x}Mn_xTe$ ($0.07 \leq x \leq 0.21$) was investigated in the temperature range $10 \text{ mK} \leq T \leq 40 \text{ K}$. A paramagnetic spinglass transition was observed in the whole temperature range (Fig. 1). The concentration dependence of the freezing temperature T_f was found to be compatible with a radial dependence of the exchange interaction between manganese ions of the type $J(R) \propto R^{-6.8}$ (Fig. 2). It appears from the available data that this radial dependence is rather universal for all II-VI wide gap semimagnetic semiconductors. A comparison is also made with other semimagnetic semiconductors and the physical exchange mechanism is discussed.

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- [3] M. A. Nowak, O. G. Symk

Fig. 1. Phase diagram for ZnMnSe (●) and ZnMnTe (□ — our data, ▽ — [1]). The dashed line is a guide to the eye only

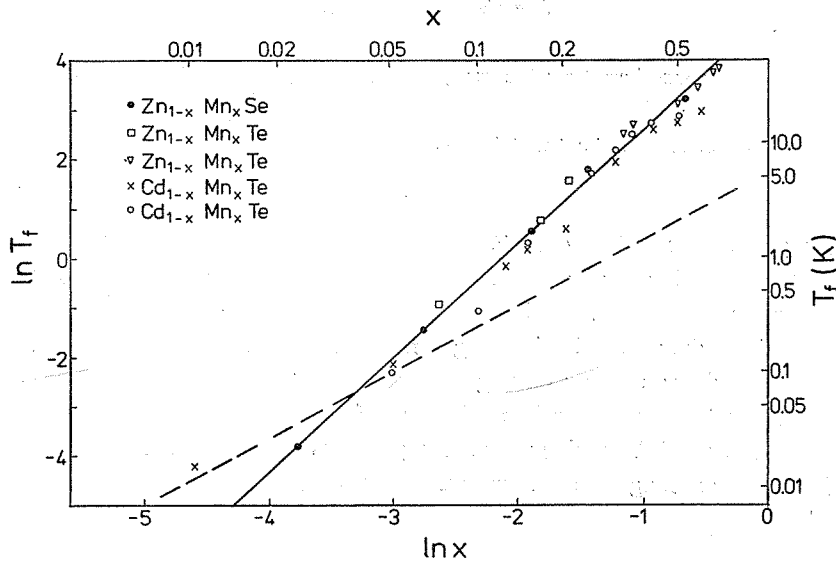
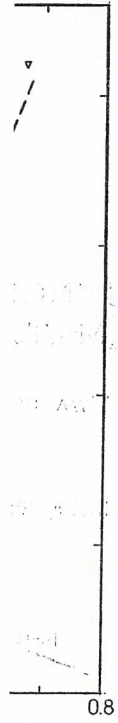


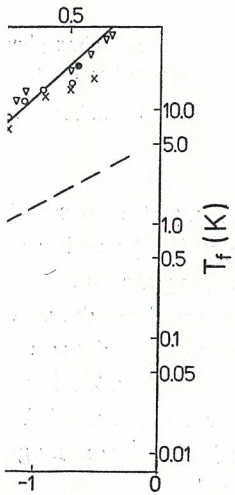
Fig. 2. Logarithm of the freezing temperature T_f as a function of $\log x$ for ZnMnSe (●), ZnMnTe (□ — our data, ▽ — [1]), CdMnTe (× — [2]) and CdMnSe (○ — [3]). The straight, solid line fitting the ZnMnSe and the ZnMnTe data has a slope equal to 2.26 yielding $J \propto R^{-6.8}$. The dashed line indicates $J \propto R^{-4.0}$

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- [2] R. R. Gałazka, S. Nagata, P. H. Keesom, *Phys. Rev.* **B22**, 3344 (1980); M. A. Nowak, O. G. Symko, D. J. Zheng, S. Oseroff, *J. Appl. Phys.* **57**, 1, 3418 (1985); M. Escorne, A. Mauger, R. Triboulet, J. L. Tholence, *Physica* **107B**, 309 (1981).
- [3] M. A. Nowak, O. G. Symko, D. G. Zheng, S. Oseroff, *Physica* **126B**, 469 (1984).



— [1]. The dashed line is a guide



ZnMnSe (●), ZnMnTe (□) — our
 data, solid line fitting the ZnMnSe
 data, dashed line indicates $J \propto R^{-4.0}$