

Delayed electron capture and Mu^- formation in ZnSe and ZnS

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We have investigated monocrystalline samples of the wide bandgap II-VI semiconductors ZnSe and ZnS. The samples were highly resistive due to heavy compensation of these n-type semiconductors. In low transverse fields, clear signs of conversion from a paramagnetic to a diamagnetic fraction are observed, at about 60 K for ZnSe (Fig. 1) and at about 100 K for ZnS. The data are interpreted as delayed electron capture by paramagnetic muonium, forming the doubly charged state Mu^- . The implications with respect to the electrical activity of muonium, and by analogy hydrogen, in these semiconductors are analysed.

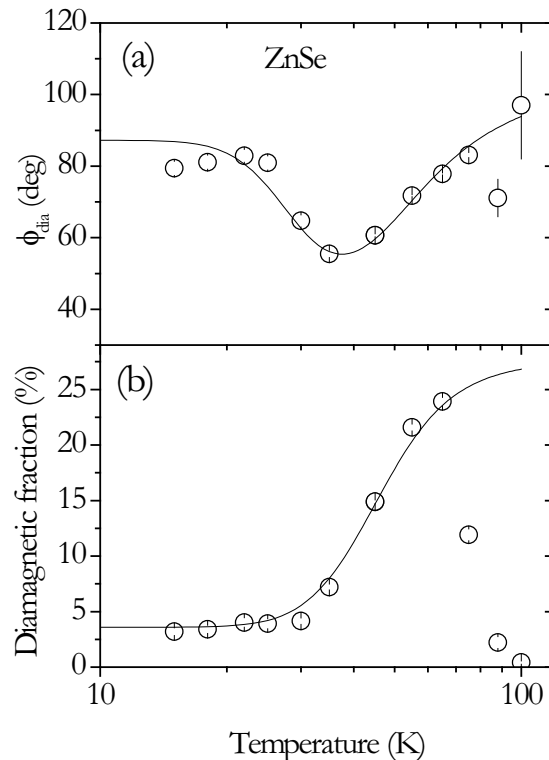


Fig. 1: Temperature dependence of the diamagnetic (a) phase and (b) fraction observed in a ZnSe sample for a transverse field of 10 G. The phase-shifted growth of the diamagnetic fraction occurs concomitantly with a decrease of the paramagnetic fraction, associated with relaxation (not shown).