Table 1

Element	H_o (Oe)	T_c (^oK)	θ_D (^oK)	γ exp (mJ/K^{2}mol)	γ calc (mJ/K^{2}mol)
GaI	59.3	1.08	317	0.598 [10]	1.02
GaII	620	6.24	200 [2]	1.63	0.92
Al	103	1.17	423	1.36 [10]	0.90
In	293	3.39	108	1.70 [10]	1.23

1 illustrate the relationship between Al, GaII and In.

In addition the question whether the change of the electron-phonon coupling constant or the increase in the density of states is responsible for both the high T_c and the high γ of GaII, compared with GaI, can be answered. We may do this by using an expression for T_c given by Jensen and Maita [5] and by McMillan [6]. Moreover we use an expression for γ due to Migdal [7].

$$T_c = 0.69\ \theta_D \exp\{-(1+\lambda)/(\lambda - \mu^*)\} \quad (2)$$

$$\gamma \propto N(E_F)(1+\lambda)\ . \quad (3)$$

Here λ denotes the electron-phonon coupling constant, μ^* is the effective Coulomb interaction and θ_D is the Debye temperature. $N(E_F)$ is the band structure density of states at the Fermi surface. μ^* is taken to be 0.10, a value which has recently been confirmed by isotope effect measurements [8]. Assuming $\lambda = N(E_F)\cdot V_{ph}$ it turns out that V_{ph}, the electron-phonon interaction coefficient, is decreased by going from GaI to GaII, while the density of states at the Fermi surface is increased by a factor of 2.3.

According to Ziman [9] we may also write

$$\lambda \approx C^2/M\,\theta_D^2 \quad (4)$$

where M is the atomic mass and C is a measure for the rigid-ion potential in the electron-phonon interaction. The change from GaI to GaII decrease C^2 by a factor of about 1.4. It may be, however, that the uncertainty in θ_D in the high pressure phase [2] is too large to make any reliable conclusions.

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