

## How can SDW change the unstable F.M to stable AF.M in Gd-IMC

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Great exchange dispersion, as distribution of local magnetic field and fluctuation about it, is observed in AC susceptibility of some Gd-Intermetallic compounds (IMC). In order to interpret the suppress of the magnetic broad range transition as a dynamic nonequilibrium process of transition (high entropy with low value of  $\chi(T)$ ), the effect of bathing on AC susceptibility and X-R is considered. The dependence both AC susceptibility and X-R on heat treatment is the cause of short range order by which the strong correlated electron system leads to the decreasing of correlation length - where the displacement of magnetic ions in the range of  $x=0.058\text{\AA}$ ,  $y=0$ ,  $z=0.74\text{\AA}$  is investigated. Even though, it will be a question whether the exchange interaction or atomic displacement is the main cause of this phenomenon, the decrease of the correlation length from  $3.6\text{\AA}$  for Gd to  $Rc\ 3.2\text{\AA}$  should be considered. This effect could increasing the density of states, as increasing of amplitude of condensation on which the on-site and inter-site exchange can compete.. In this case, the effective mass is large and consequently the magnetic phase transition is derived from condensation energy which is approximately equal to  $N(E_f)$ , where  $E_f$  is the magnitude of the energy gap opened by the transition at which the unstable F.M order collapse to AF.M order at  $T_N=48-60\text{K}$ . Above this gap system behaves completely paramagnetic.