ELECTRONIC STRUCTURES AND VARIOUS PHYSICAL PROPERTIES OF Ni_3Al ALLOY

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9.7 cm

The magnetic, optical and magneto-optical properties of slightly off-stoichiometric γ'-phase Ni_3Al alloy ($Ni_{0.771}Al_{0.229}$) have been investigated experimentally and theoretically. The optical-conductivity spectrum exhibits a multiple-peak structure in the near-infrared region. It is shown that the fine structure of the low-energy absorption features is originated from the spin-ordering in the alloy and experimentally shown that this fine structure persists up to room temperature. This feature was theoretically predicted, but not experimentally confirmed previously. The temperature dependencies of the magnetic, optical and magneto-optical properties of $Ni_{0.771}Al_{0.229}$ alloy can be ascribed to the presence of magnetic inhomogeneity in the sample. DC magnetic-susceptibility measurements confirms the existence of magnetic inhomogeneity in the alloy. The $\chi(T)$ curve exhibits two magnetic transitions, one at 87.5 K and the other at 252K. The spin ordering and Ni enrichment, or Ni clusters, play a key role for the physical properties.

13.4 cm

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