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Speaker:

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Title:

Electrical Transport and Magnetic properties of CoNiAl Ferromagnetic Shapememory Alloy

Abstract:

Ferromagnetic shapememory alloys (FSMAs) are versatile and best materials for the applications as sensors and actuators due to their smart behavior and faster response than the ordinary SMAs. In this line we have studied the electrical transport and magnetic properties of CoNiAl FSMA earlier and succeded in making an actuator out of these materials. To further improve their properties and to study the MFIS of these materials recently we have made Al27 series, Al29 and Al30. Out of all these, I am going to present CoNiAl alloy with the composition $Co_{35}Ni_{35}Al_{30}$. The sample was made with arc melting technique and annealed at 1200^0C/24h and quenched in water. It was characterized by XRD, SEM EDAX, DSC, and magnetization. It was found that it possesses two phases at room temperature (both β and γ). The presence of γ solid solution (disordered F.C.C. structure) as a second phase in the CoNiAl system renders the β-phase ductile at room temperature and makes it useful for practical applications. The transformation temperatures of the present CoNiAl alloy were obtained from DSC and electrical transport measurements. These were found to be T_{Ms} = 175 K, T_{Mf} = 105 K, T_{As} = 185 K and T_{Af} = 205 K and T_c (β) = 225 K The magnetic field effect was studied at different field levels starting from 50Oe to 10 kOe by using SQUID. In the present paper we are presenting the effect of magnetic field level on the martensitic transformation temperature of the sample and how the magnetic field hysteresis varies with the field.
