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Speaker:

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(VASP short term visitor to Prof. P.K. Mukhopadhyay)

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Title:

Stress induced Martensitic transformation in a CoNiAl Ferromagnetic Shapememory alloys using Vibrating Reed Apparatus

ABSTRACT:

Ferromagnetic Shapememory alloys (FSMAs) due to their smart behaviour and huge magnetic field induced strain attracting immense interest nowadays. In these FSMAs CoNiAl Ferromagnetic Shape memory Alloy because of its two phase microstructure and gamma phase precipitates is much ductile and practically useful material for sensors and actuators application. Keeping these points in view $\text{Co}_{42}\text{Ni}_{31}\text{Al}_{27}$ alloy was made using arc melting method and annealed at 1373 K/24h subsequently at 1473 K/72h. The structure and microstructure of the samples was studied by using XRD, SEM and EDAX. The structural transformation temperatures were obtained using four probe resistivity measurements. The structural transformation temperatures were found to be $T_{Ms} = 240\text{K}$, $T_{Mf} = 210\text{K}$, $T_{As} = 215\text{K}$, $T_{Af} = 255\text{K}$ respectively and T_c was found to be above room temperature (obtained from the VSM data carried out from 300 K. to 463 K). The elastic properties were studied on the reed shaped samples as a function temperature and stress level. Near the structural transformation temperatures internal friction measurement shown sharp peaks in the higher stress level and a huge shift in the martensitic transformation temperature was observed in the higher stress level as compared to medium and lower stress levels. Results on such measurements were presented which through a light on the structural parameters shift with respect to the applied stress as function of temperature.

Keywords: CoNiAl Ferromagnetic Shape Memory Alloys, Thermoelastic Martensitic Transformation, Stress relaxation, Sound Velocity and Internal Friction