**Enhancement of elastic property in a CoNiAl ferromagnetic shape memory alloy and it’s magnetic, electronic and lattice contribution**

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In this investigation, two alloys of nominal compositions Co42Ni31Al27 and Co40Ni32Al27 have been synthesized. Their structure and microstructural properties confirmed the growth of non-ferromagnetic shape memory alloys of face-centered cubic $γ$ phase as an inter-grain of the body-centered cubic $β$ phase. Due to the replacement of $\~2\%$ Co by Ni in the studied Co-Ni-Al system, the amount of $γ$ phase is increased by 1.5 times. Moreover, martensitic transition temperatures shifted to the higher side and the enthalpy during this martensitic transition dropped from 1.74 J/g to 0.25 J/g. Finally, temperature-dependent dynamic elastic properties have confirmed the existence of elastic recovery in both samples, in between the temperatures from 120 K to 300 K, however, the lattice contribution and electronic contribution are much higher in the Co40Ni32Al27 sample. Due to the nominal decrement of Co, the alloy system Co40Ni32Al27 demonstrated improved physical properties which might be promising for functional applications.

 

**Fig. 9.** Microstructure and the selective regions for B2 matrix ($β$ Phase) along with $γ$ phase growth as intergrain in **(a)** Co42Ni31Al27 and **(b)** Co40Ni31Al27 sample.

**Keywords:** Microstructure, Phase fraction, Internal Friction, Lattice contribution, Martensitic Transformation.

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