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Annealing effect on the crystal structure in Heusler Ni45.5Mn43.0In11.5

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Heusler based magnetic shape memory alloys exhibit functional properties as magnetocaloric effect, high magnetoresistance or shape memory behavior; probably due to the existence of martensitic phase transition with a strong magneto-structural coupling. These alloys are candidates for applications as sensors, actuators or magnetic coolers. In this work, the crystal structures of the Ni45.5Mn43.0In11.5 annealed ribbon was followed at 150 K, 300 K and 350 K, whereas as quenched ribbon was analyzed at 100 K and 300 K. Experiments were performed at Diamond Light Source, UK, in the range between 10º and 100º by employing radiation of λ=1.127 Å. It was found that austenite is the stable phase at room temperature before annealing. After annealing, martensite is the stable phase (monoclinic with a 10M modulation). Thus, martensitic transformation is shifted to higher temperatures. There are also important changes on the texture in reflection peaks located in the 42º to 44º region. Complementary thermomagnetic measurements were performed and it was found that the sample is in a paramagnetic state above and below the martensitic start temperature.

References

Annealing effect on the crystal structure and exchange bias in Heusler Ni45.5Mn43.0In11.5 alloy ribbons. L. González-Legarreta et al.
Journal of Alloys and Compounds 582 (2014) 588-593.

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