Microstructures in modulated martensites – experimental observations and theoretical models

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ABSTRACT

Modulated martensites of Ni-Mn-Ga ferromagnetic shape memory alloys are able to form complex, hierarchical microstructures of twins and macro-twin interfaces. Some of the macro-twins in this material exhibit a very unique property called supermobility [1], i.e. such interfaces can be set into motion by as small mechanical stress as 0.01MPa and can be also easily driven by external magnetic fields. The origin of the supermobility is not fully understood yet. It is, however, believed that this phenomenon may be related to the the ability of Ni-Mn-Ga to form martensitic microstructures at very fine spatial scales, and thus, to specific lattice parameter and crystal structure of this alloy.

The talk will summarize the recent experimental observations of microstructures in 10 M modulated Ni-Mn-Ga, and outline the main theoretical tools used for describing their formation. It will be shown that these microstructures exhibit several unique features [2], not observed in any shape memory alloy before, which open a discussion whether other alloys with supermobile interfaces could be, in future, designed based on the knowledge gained on Ni-Mn-Ga.

REFERENCES

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