MM 32: HV Fähler

Time: Thursday 9:30–10:00 Location: H 1058

Invited Talk MM 32.1 Thu 9:30 H 1058

Magnetic Shape Memory Alloy Films: What is different to bulk materials? — •Sebastian Fähler — IFW Dresden, Institute for Metallic Materials, P. O. Box 270116, 01171 Dresden, Germany

Bulk single crystals made of magnetic shape memory alloys reach strains up to 10% when applying a moderate magnetic field below 1 T. When these materials have easily moveable twin boundaries, reorientation of martensitic variants can occur. Variants having the easy magnetization axis along the field direction can grow preferentially. Due to the different axis length of the martensitic unit cell, a macroscopic change of length can be obtained. After summarizing the phenomenology of this effect for bulk single crystals, the different behavior observed in thin, epitaxial Ni-Mn-Ga and Fe-Pd films is analyzed. It is shown that the substrate influences several properties. First the film orientation can be controlled by epitaxy. Additionally a biaxial stress with respect to the substrate induces the martensitic transition. The boundary condition towards a rigid substrate reduces the number of observed variants. Though no macroscopic strain is expected in constrained films, it is shown that the additional free parameter of an orthorhombic structure allows a magnetically induced microstructure reorientation within a film even though its overall dimensions are constrained by the substrate. Additionally first experiments on free standing films are presented, showing the influence of a rigid substrate on phase formation and variant orientation.

This work is supported by DFG through SPP 1239 "www.MagneticShape.de"