

**PHASE DIAGRAMS FOR THE EVOLUTION OF POLYDOMAIN  
AND POLYVARIANT STATES IN TETRAGONAL  
FERROMAGNETIC MARTENSITES**

**A.T. Onisan<sup>a</sup>, N.S. Kiselev<sup>b</sup>, U.K. Röbller<sup>a</sup>, A.N. Bogdanov<sup>a</sup>**

<sup>a</sup>IFW Dresden, Postfach 270116, 01171 Dresden, Germany

<sup>b</sup>Donetsk Institute for Physics and Technology, 83114 Donetsk, Ukraine

A continuum model for equilibrium microstructures in ferromagnetic twinned martensites is developed [1] that couples micromagnetic domain theory with anisotropic crystal elasticity and is applicable for magnetic shape memory materials as the Ni-Mn-Ga Heusler alloys. The approach considers the twin variant redistribution in tetragonal martensites with no-slip condition at the twin boundaries, magnetic 180° domain structures within twins, and the rotation of magnetization within domains due to finite magnetic anisotropies. For two-variant twinned single crystals, we calculate equilibrium phase diagrams, strain and magnetization curves under combined applied magnetic fields and external stresses within the thermodynamic phase theory approximation. The limitations of the phase-theory approximations are discussed. For three-variant twinned microstructures, we show that magnetic charges arise internally at the twin boundaries. Work supported by DFG, SPP 1239 project A08.

[1] A.N. Bogdanov, A. DeSimone, S. Müller, U.K. Röbller, *J. Magn. Magn. Mater.* 261 (2003) 204.

9.7 cm

13.4 cm

**Subject category :**

6. Soft and Hard Magnetic Materials

**Presentation mode :**

poster

**Corresponding author :**

U.K. Röbller

**Address for correspondence :**

IFW Dresden, Postfach 270116, 01171 Dresden, Germany

**Email address :**

u.roessler@ifw-dresden.de