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DETERMINATION OF ELASTIC AND INELASTIC FREE ENERGY CONTRIBUTIONS IN MARTENSITIC TRANSFORMATIONS

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We carried out measurements on Cu-Al-Ni single crystalline and polycrystalline materials. Our measurement technique was completed by a microscopic cooling-heating stage. Using this device it is possible to observe the martensitic transformation by optical microscope in wide temperature range (200-500K). Observations under uniaxial stress and resistance measurements are also possible.

Using our evaluation technique the non-chemical free energy contributions related to the martensitic transformation as a function of the transformed fraction were determined from experimental data. The absolute values of the elastic free energy component and the equilibrium temperature (T_0) were also determined using the developed evaluation method.

The stress dependence of the equilibrium temperature was also measured. The results are in good agreement with the calculated values from the Clausius-Clapeyron equation, that is based on experimental data of the transformation strain. This shows the reliability and self-consistency of the analysis.

Novel method was developed for the evaluation of DSC data measured on shape memory alloys. This method increases the accuracy of the heat flow DSC-s taking into account the balancing heat flow between the sample and the reference.

Magnetic Barkhausen-noise measurements were performed on ferromagnetic shape memory alloy (Ni2MnGa). The pulse height and width distributions characterising the magnetic emission process during the martensitic transformation were studied. The temperature dependence of the different statistical noise parameters was measured in martensitic state in wide temperature range.

Our results were published in the form of articles as well as oral and poster presentations on ESOMAT 2006 conference [1–7].

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