

Přednáška

Time dependency and minor loops of the martensitic transformation

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Martensitic transformations in magnetic shape memory alloys lead to large temperature- and field-dependence of the magnetization and accordingly to large entropy changes. These ferroic materials are discussed for applications in solid-state cooling cycles, but only if the thermal hysteresis can be reduced. Therefore it is important to understand the origin of hysteresis and to differentiate the contributions of nucleation and growth. As a model system we study epitaxial thin films of Heusler alloy Ni-Mn-Ga-(Co). The shape of the nucleus is known from in-situ experiments. We calculate the theoretical barrier for homogeneous nucleation using a continuum model of the nucleus and employing classical nucleation theory. From time-dependence of the magnetization we can identify growth and nucleation events and calculate the respective energy barriers. The energy necessary for nucleation is also derived from the difference between full and minor loops of the transformation. We conclude that only heterogeneous nucleation is possible and show that the barrier is effectively reduced by nanoindentation. Funded by DFG SPP1599 www.FerroicCooling.de

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