

# **Magnetic shape memory materials for better life**

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Ferromagnetic shape memory alloys (FSMAs), such as prototype NiMnGa Heusler compounds, are well-known for their ability to generate a large magnetic field-induced strain, MFIS. This effect is due to a magnetic field induced reorientation of the martensitic domains. Other Heusler-type materials, typically Mn-rich NiMnX compounds (X= In,Sn,Sb), known as the metamagnetic shape memory alloys (MetaMSMAs), exhibit a large MFIS recovery of the preliminary deformed martensite due to the mechanism associated with the field-induced reverse martensitic transformation (MT). According to a magnetoelastic model the first mechanism is triggered by a magnetostress and related magnetoelastic energy. The second one is mainly controlled by a Zeeman energy term.

MetaMSMAs are under intense world-wide studies since they exhibit inverse giant magnetocaloric effect due to the field-induced reverse MT. On the other hand, Ni-Mn-Ga show a giant conventional MCE at MT merged with Curie temperature. These materials are very promising for the magnetic refrigeration at ambient.

My presentation intends to get you more familiar with the academic and applied aspect of these Heusler-type multifunctional materials, especially in context of actuation and energy conversion.