

Hysteresis design of magnetic materials for efficient energy conversion

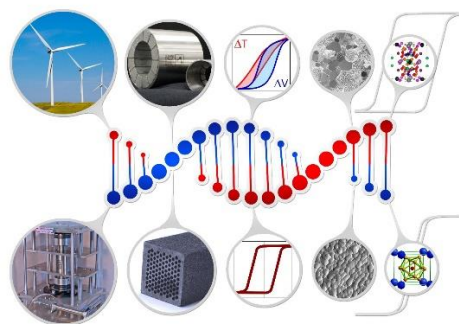
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Abstract

Magnets are key components of energy-related technologies, such as direct drive wind turbines and e-mobility. They are also important in robotics and automation, sensors, actuators, and information technology. The magnetocaloric effect (MCE) is of strong interest for new and disruptive solid state-based refrigeration. Magnetic hysteresis – and its inherent energy product - characterises the performance of all magnetic materials. Despite considerable progress in the modelling, characterisation and synthesis of magnetic materials, hysteresis is a long-studied phenomenon that is still far from being completely understood. Discrepancies between intrinsic and extrinsic magnetic properties remain an open challenge and magnets do not operate yet at their physical limits. The design of hysteresis for the magnets for the above applications requires an expanded detailed knowledge on different length scales. Ultimately, new strategies for effective magnetic hardening mechanisms of permanent magnets resisting high external magnetic fields and temperatures and for strong thermomagnetic responses in low fields of magnetocaloric materials are needed.

In this context, I will introduce our newly established DFG Cooperate Research Center 270 Hommage Hysteresis Design of Magnetic Materials for Efficient Energy Conversion <https://www.tu-darmstadt.de/sfb270>.



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