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Hysteresis Design of Magnetic Materials for Efficient Energy Conversion

Tuesday, 21 June 2022, 9:00 s.t., TU Darmstadt, L2|01 R77 and Zoom

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Magnetic properties of nanocrystalline materials produced by severe plastic deformation

Abstract:

Severe plastic deformation (SPD) is nowadays a well-known method of nanocrystalline material synthesis. One key feature of SPD is the constancy of sample's volume and shape during the deformation process, which allows the production of samples exhibiting bulk dimensions. In this work, it is shown that SPD or combinations with different initial processes (ball milling, arc melting) can be used to synthesize different nanostructured soft and hard magnets. In SPD deformed immiscible systems (Fe-Cu, Fe-Cr, Cu-Co), soft magnetic properties were obtained. In Cu-Co alloys, for example, the coercivity can be tuned by varying the chemical composition. From an application viewpoint, the most important magnetic properties are magnetoresistivity and magnetostriction. The SPD deformed immiscible material systems are thus examined regarding their magnetoresistive and magnetostrictive properties as well. Furthermore, the use of SPD to process magnetic nanocomposites and exchange biased permanent magnets is shortly presented.

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About the speaker:

Andrea Bachmaier studied Materials Science at the University of Leoben and received her PhD degree in 2011. In 2013, she was awarded an Erwin-Schrödinger scholarship that allowed her to work on the decomposition process of supersaturated solid solutions and its influence on the thermal stability. In 2017 and 2022, she received an ERC Starting Grant and a ERC Proof of Concept Grant, respectively. Currently, she is leading a research group at the Erich Schmid Institute of Materials Science, Austria. Her primary research focus is on the generation of metastable materials, novel nanocomposites and nanocrystalline metal-matrix composites by SPD and the investigation of their functional and mechanical properties.