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Hysteresis Design of Magnetic Materials for Efficient Energy Conversion

Tuesday, 06 June 2023, 9:00 s.t., TU Darmstadt



**Dr. Nora Dempsey**  
Institut NEEL, CNRS,  
Grenoble, France

Zoom information:

Meeting-ID: 632 7244 1610

Kenncode: 803560

## High throughput combinatorial studies of the effect of element substitution in RE-TM films

### Abstract:

Combinatorial studies based on the preparation and characterisation of compositionally graded thin films are being used for the screening and optimization of a range of functional materials [1]. When combined with Machine Learning (ML), such high-throughput film-based studies hold much potential to guide data driven design of new materials [2,3]. In this talk I will present combinatorial studies of hard magnetic films. By way of introduction to the high throughput fabrication and characterisation techniques we use, I will begin by presenting a study of compositionally graded Fe-Pt films [4]. I will then present on-going studies of the effect of element substitution and annealing conditions on both structural and magnetic properties of compositionally graded RE-TM films based on the 2-14-1 and 1-5 high anisotropy phases. I will finish up by briefly outlining the potential of combining high throughput experimentation and ML-driven data analysis for the accelerated development of rare earth permanent magnets with reduced dependence on critical elements [5].

[1] ML Green et al., J. Appl. Phys. 113 (2013) 231101

[2] A.G. Kusne et al. Sci. Rep. 4 (2014) 6367

[3] A. Ludwig, npj Comput. Mater. 5 (2019) 70

[4] Y. Hong et al., J. Mater. Res. Technol. 18 (2022) 1245

[5] Kovacs et al., Front. Mater. 9 (2023) 1094055

### About the speaker:

Nora Dempsey received her PhD from Trinity College Dublin in 1998 and her HDR (Habilitation à Diriger des Recherches) from Université Joseph Fourier, Grenoble in 2012. Following her thesis, she was a Marie Curie postdoctoral fellow at Laboratoire Louis Néel, CNRS in Grenoble. She was hired as a Junior Scientist (Chargée de Recherche) at CNRS in 2001 and was promoted to Senior Scientist (Directeur de Recherche) in 2014. She is a member of the Micro and Nano Magnetism group at Institut Néel. Her research interests include the study and development of functional magnetic materials in film form, with a particular emphasis on hard magnetic materials. She has been involved in many collaborations with both academic and industrial partners at national and international levels.

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Spokesperson: Prof. Dr. Oliver Gutfleisch • Co-Spokesperson: Prof. Dr. Michael Farle

Management: Dr. Sonja Laubach • L2|07 107 • sonja.laubach@tu-darmstadt.de • +49 (0)6151 16-22153

Address: CRC/TRR 270 • TU Darmstadt • Peter-Grünberg-Str. 16 • 64287 Darmstadt