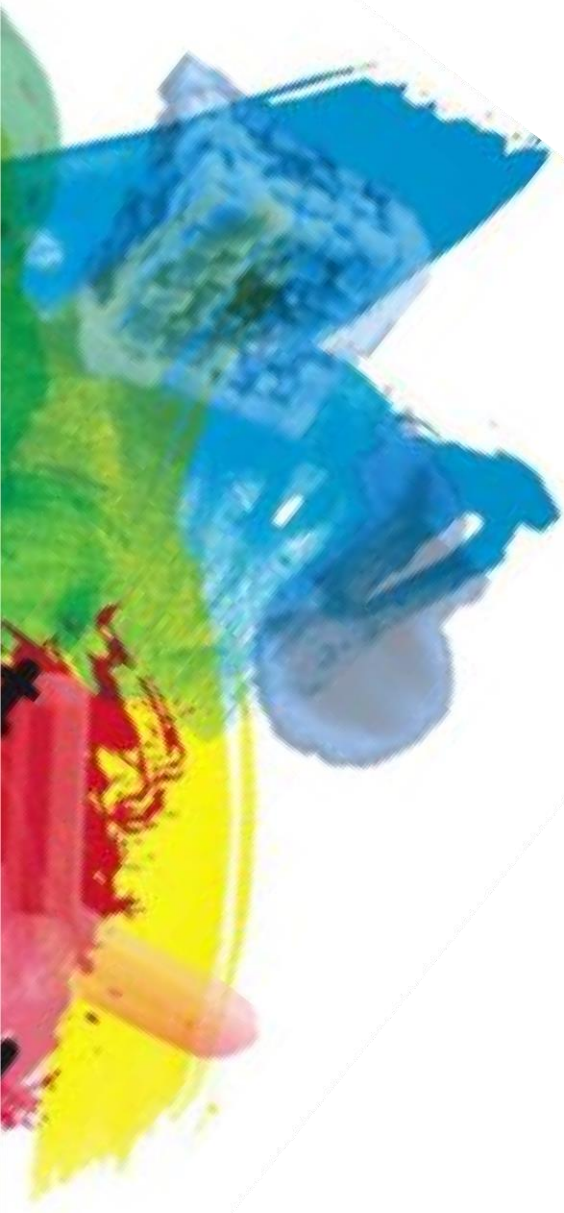
Jožef Stefan Institute
Ljubljana, Slovenia | K7 / Department for Nanostructured Materials

SEMINAR

Friday, 12. 05. 2023, 13.00, IPS lecture hall

GRAIN BOUNDARY ENGINEERING OF Nd-Fe-B PERMANENT MAGNETS



Mihaela Rebernik

Neodymium magnets are the most powerful permanent magnets available today and are used in a broad range of applications. Sintered Nd-Fe-B magnets have excellent magnetic properties at room temperature but suffer from a lack of performance at high temperatures, mainly due to the low Curie temperature and the temperature sensitivity of the anisotropy field (H_A) of the $Nd_2Fe_{14}B$ phase that is reflected in a decrease of coercivity. To improve the performance of these magnets, heavy rare earth (HRE) elements such as dysprosium (Dy) and terbium (Tb) are added to the initial alloy, which are effective in enhancing the H_A of the $Nd_2Fe_{14}B$ phase. However, they are geographically scarce and subject to price volatility and are therefore recognised as one the most critical raw materials (CRM) for the EU. This has prompted research in reducing the amount of HRE in neodymium magnets with still aiming at high performances. One promising method is the grain boundary diffusion process (GBDP), which involves diffusing the heavy rare-earth elements into the $Nd_2Fe_{14}B$ with diffusing them along the grain boundaries of the Nd-Fe-B magnet. In trend towards HRE-free magnets, the research has also begun on using light rare earth (LRE) and non-rare earth elements (NRE) in the GBDP process for coercivity improvements.

Kindly invited.