Nanostructured materials | Jožef Stefan Institute Ljubljana, Slovenia

Open MSc position: ”Advanced Sintering Techniques for Enhancing the Properties of Ce–Fe–B Permanent Magnets”

Topic description: Permanent magnets based on the hard-magnetic $Ce_2Fe_{14}B$ phase represent a sustainable alternative to Nd–Fe–B magnets, which contain approximately 30 wt.% of the critical element Nd. However, the magnetic performance of Ce–Fe–B magnets remains inferior to that of $Nd_2Fe_{14}B$-based systems due to the lower intrinsic properties of the $Ce_2Fe_{14}B$ phase, including saturation magnetization, Curie temperature, and anisotropy field. The proposed research will address this limitation through the development of novel processing routes aimed at increasing the anisotropy field in the surface regions of the grains. By combining selected doping elements (Nd, Tb, Dy) with advanced sintering techniques that enable lower processing temperatures and shorter sintering times than conventional methods, extensive interdiffusion and chemical homogenization within the grains will be suppressed. This approach is expected to yield high-performance magnets with improved temperature stability.

Requirements for candidates:

- Bachelor’s degree in Natural Sciences
- Enrolment in master’s study course in Natural Sciences
- Knowledge of English

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