



The Functional Materials group headed by Prof. O. Gutfleisch at the Department of Materials and Earth Science at TU Darmstadt is offering a position as

## Research Assistant/ Ph.D. Student (all genders) - Multi-property Compositionally Complex Permanent Magnets – 75 %

with a fixed-term contract of 3 years within the EIC Pathfinder Open project consortium CoCoMag.

The field of permanent magnets is of significant interest across industries such as wind power, electro-mobility, robotics, and medical instrumentation. However, the reliance on high-performance rare earth-based magnets faces challenges due to the critical raw material supply. Compositionally complex alloys (CCAs) present a promising solution to this issue due to their unique properties. CCAs are alloys consisting of four or more elements in approximately equal proportions, resulting in a highly disordered crystal structure. This disorder enhances the magnetic properties of the material, including magnetization and coercivity, leading to a significantly higher magnetic energy product compared to conventional hard magnetic materials. To advance this field, a Ph.D. position is available for individuals interested in designing and developing new hard magnetic materials using CCAs. The opportunity is part of the high-risk/high-gain EIC Pathfinder Open project consortium CoCoMag, coordinated by Prof. Oliver Gutfleisch.

The position is based in the internationally renowned Functional Materials Group, which focuses on the development of resource-efficient functional materials. The topics of interest of the group range from permanent magnets, magnetocaloric materials and ferromagnetic shape memory alloys to magnetic materials for biomedical applications with a focus on synthesis, characterization, and modeling of magnetic, thermal and (micro-)structural properties.

**Your tasks** within the project will be to investigate the fundamental principles of design and synthesis of magnetocaloric materials based on compositionally complex alloys. Your work will include the synthesis and characterization of CCA using various synthesis routes (such as arc melting, ball milling, melt spinning and powder metallurgy) and advanced characterization routes to understand their (micro-) structural and magnetic properties as well as their mechanical, thermodynamic and corrosion stability. You will develop a generalized design concept for multi-element alloys. In addition to the scientific work, the candidate will be expected to collaborate proactively with the other research teams within the EIC Pathfinder project consortium and within the Functional Materials Group, to present high quality research at conferences and to publish the results in peer-reviewed journals.

**Your profile:** We are seeking a highly motivated Ph.D. candidate with a masters degree in materials science, physics, or chemistry to join our research team. Knowledge of alloy design principles and advanced characterization techniques would be an advantage. Fluency in English, both written and spoken, is required to effectively present research results, contribute to discussions and collaborate with researchers from diverse backgrounds. The ability to work in an international group, with individuals from different cultures and disciplines, is highly valued as it fosters a rich and collaborative research environment that encourages the exchange of ideas and perspectives.

**We offer** the opportunity to do a doctorate on a highly topical research topic in the field of functional materials for energy conversion and excellent working conditions in an international team. and excellent working conditions in an international team with integration in a scientific network of renowned experts in the magnetic materials community. network of renowned experts in the magnetic materials community. The Technical University of Darmstadt offers a varied, multifaceted working environment, independent work, demand-oriented further training opportunities and individual personnel development. A company health management system and work-life balance are a matter of course. In addition, you will receive a free travel pass for local and regional public transport in the state of Hesse (LandesTicket Hessen) in accordance with current regulations and the advantage of the deferred compensation scheme in favour of a "Job Rad" leasing model.

Opportunity for further qualification (doctoral dissertation) is given. The fulfillment of the duties likewise enables the scientific qualifications of the candidate.

The Technische Universität Darmstadt intends to increase the number of female employees and encourages female candidates to apply. In case of equal qualifications applicants with a degree of disability of at least 50 or equal will be given preference. Wages and salaries are according to the collective agreements on salary scales, which apply to the Technische Universität Darmstadt (TV-TU Darmstadt).

Please send applications (all in a single PDF file) with the usual documents, quoting the reference number as a pdf file, by e-mail to [info@fm.tu-darmstadt.de](mailto:info@fm.tu-darmstadt.de). If you have any questions, please contact Dr. Semih Ener ([semih.ener@tu-darmstadt.de](mailto:semih.ener@tu-darmstadt.de)) or Prof. Oliver Gutfleisch ([oliver.gutfleisch@tudarmstadt.de](mailto:oliver.gutfleisch@tudarmstadt.de)).

The website of the FM Group can be found at → <https://www.mawi.tu-darmstadt.de/fm>.

By submitting your application, you agree that your data may be stored and processed for the purpose of filling the vacancy. You can find our → [privacy policy](#) on our webpage.

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