

THESIS – MAGNETOCALORICS

Characterization of Magnetocaloric Materials under Operational Conditions

Magnetocaloric materials show temperature activity in changing magnetic fields and can be applied in magnetic cooling devices (MCD). Alloys based on lanthanum-iron-silicon (LaFeSi) are promising materials in pre-industrial development stage. For commercialization, remaining challenges have to be overcome including efficient implementation of LaFeSi into MCDs. The goal is to study applicability of LaFeSi optimizing housing designs with CAD, their 3D printing methods, material implementation and testing their performance under real conditions. Based on data evaluation, the process will be iterated to use the materials efficiently. The work will be carried out in the laboratory facilities of Functional Materials research group in close cooperation with its spin-off MagnoTherm Solutions.

Your Tasks

- Optimize design of active magnetic regenerators (AMR) in CAD
- Optimize 3D printing methods (FDM) with our Raised3D printers
- Preparation of AMR modules with LaFeSi
- Extensive testing of AMR modules in our unique magnetic cooling test bench
- Evaluation of performance data including cooling power, temperature spans, pressure drop and more

Your Qualifications

- Background in mechanical engineering, material science or similar
- Knowledge in Fusion 360 is a big plus
- Basic knowledge in magnetism
- Basic knowledge in data evaluation
- Motivation to work in an interdisciplinary subject as well as reliable and independent work ethos
- Good English language skills

What We Offer

- A meaningful and high-impact mission to fight global warming
- Interesting task at the intersection of research and engineering
- Interdisciplinary team with unique expertise to learn from
- Supporting work environment to grow personally and professionally
- Insights into the workflow of a world-leading research group and start-up

How to Apply

- Send your current transcript from your university programme and CV/ LinkedIn profile to semih.ener@tu-darmstadt.de or jobs@magnotherm-solutions.com
- Short description of you, your personal goals, starting date, link/ information on reference projects (if available) and why you want to join us on our mission

About Functional Materials

Functional Materials is the research group of Prof. Oliver Gutfleisch in the Institute of Material Science at Technical University of Darmstadt. Research fields include novel permanent and soft magnets, magneto- and elastocaloric, magnetostrictive materials and magnetic shape memory alloys and more generally on materials for efficient energy storage, transportation and conversion.

About MagnoTherm Solutions

MagnoTherm Solutions develops a revolutionary refrigeration technology based on magnetic materials. Our vision is to provide the cleanest and most sophisticated cooling and heating solutions for everybody to reduce climate impact and costs. Founded in 2019, our start-up is a spin-off from Functional Materials research group of Prof. Oliver Gutfleisch at Technical University of Darmstadt.



THESIS – MAGNETOCALORICS

Chemical Treatment of Magnetocaloric Materials

Magnetocaloric materials show temperature activity in changing magnetic fields. Alloys based on lanthanum-iron-silicon are promising materials in pre-industrial development stage. For commercialization, remaining challenges have to be overcome including surface treatment of these type of alloys. A surface treatment of the alloys allows for the long-term use of magnetocaloric materials in magnetic cooling devices. The aim of the work is to increase the strength and corrosion resistance of these materials. The work will be carried out in the laboratory facilities of Functional Materials research group in close cooperation with its spin-off MagnoTherm Solutions.

Your Tasks

- Optimizing wet-chemical surface treatments of magnetocaloric materials
- SEM and magnetic measurements
- Working with chemical reactors
- Project planning and design of experiments
- Data evaluation and management

Your Qualifications

- Background in chemistry, material science or similar
- Knowledge in electrochemistry is a big plus
- Interest in organic chemistry
- Basic experience in the laboratory
- Motivation to work in an interdisciplinary subject as well as reliable and independent work ethos
- Good English language skills

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