

Job Information

Project: Magnesium Alloys for efficient solid state cooling (MGICIAN)

Funding Provider: European Union, Horizon Europe - Marie Skłodowska-Curie Actions Doctoral Networks (Grant Agreement No. 101227508)

Host Institution: Leibniz Institute for Solid State and Materials Research (IFW); Dresden, Germany

Main Supervisor: Prof. Dr. Kornelius Nielsch (IFW Dresden), Germany

Co-Supervisors: Prof. Dr. Christina Scheu, SUSMAT (Germany), Dr. Richard Tuley, ETL (United Kingdom)

Duration: 36 months (full-time employment)

PhD-awarding Institution: Technische Universität Dresden

Offer Description

Doctoral Candidate (DC) 10 – Scalable Fabrication and Advanced Coating of Magnesium-Based Thermoelectric Coolers

About the Host Institution

The Leibniz Institute for Solid State and Materials Research Dresden (IFW Dresden) is a non-university research institute conducting fundamental and applied research in advanced functional materials for sustainable technologies. The institute employs approximately 500 staff members from more than 40 countries and offers a highly international and interdisciplinary research environment. Further information is available at <https://www.ifw-dresden.de>.

About the MGICIAN Doctoral Network

MGICIAN is a Horizon Europe MSCA Doctoral Network dedicated to developing sustainable magnesium-based thermoelectric materials and translating them into high-performance solid-state cooling technologies. The network brings together academic and industrial partners across Europe and trains 15 Doctoral Candidates (m/f/div) in materials development, interface engineering, module fabrication, and system integration.

Project Overview

DC10 will focus on the scalable fabrication and advanced coating of Mg-based thermoelectric coolers. The project will explore the advanced module layouts and optimized contacts and substrates from the perspective of industrial manufacturing routes. A central objective is to enhance module durability, thermal stability, and long-term reliability while maintaining high cooling performance. Atomic Layer Deposition (ALD) will be employed to improve interface stability and encapsulate the whole module in 3D. Coated modules will be characterized under harsh environmental conditions in collaboration with industrial partners.

Research Tasks and Training Objectives

The Doctoral Candidate (m/f/div) will:

- Develop scalable fabrication routes for Mg-based thermoelectric modules for cooling.
- Apply and optimize Atomic Layer Deposition (ALD) for module encapsulation
- Characterize coated modules under harsh operating conditions with an industry partner
- Analyze degradation mechanisms by advanced characterization techniques
- Collaborate within the European MGICIAN network and disseminate research results through publications and conferences
- Participate in intersectoral secondments and structured doctoral training activities

Secondments

To strengthen interdisciplinary and intersectoral training, DC10 will complete secondments at:

- **ETL (United Kingdom)** – 2 months
Focus: Industrial-scale module fabrication and reliability testing

- **SUSMAT (Germany)** – 2 months
Focus: Advanced characterizations of coated interfaces and degradation mechanisms
- **Public University of Navarra (UPNA, Spain)** – 3 months
Focus: Device testing under harsh operating conditions

Requirements

Education

Master's degree (or equivalent) in Mechanical Engineering, Production Technologies, Materials Science and Engineering, or a closely related field. Applicants must be eligible to enrol in a PhD programme at [Technische Universität Dresden](#).

Technical Competences

- Experience with the characterization of thermoelectric materials
- Experimental background in thermoelectric materials and device fabrication
- Experience with thin-film deposition techniques (e.g., ALD, PVD, CVD) is advantageous
- Understanding of thermal transport and interface phenomena is beneficial
- Interest in scalable manufacturing and industrial production of thermoelectric devices

Personal Skills

- Strong analytical and experimental problem-solving skills
- Ability to work independently and within an international and interdisciplinary research network
- Excellent written and spoken English

Documents Required

- Copies of Bachelor's and Master's diplomas and transcripts (with certified translations if applicable)
- Candidates may apply before obtaining their Master's degree by submitting a provisional certificate; however, employment cannot commence before the degree is formally awarded

Further details are provided in the online application system.

MSCA Doctoral Candidate Eligibility Criteria

- Must not hold a PhD degree
- Comply with the MSCA mobility rule (not resided or carried out their main activity in **Germany** for more than 12 months in the 36 months before recruitment)

Additional Information

Employment Conditions

- Full-time employment contract for up to 36 months
- Salary according to the MSCA Doctoral Network regulations, including:
 - Living allowance: €4,058/month
 - Mobility allowance: €710/month
 - Family allowance: €660/month (if applicable)

The final gross and net salary will depend on the national taxation and social security contributions

- Enrolment in a PhD Programme at [Technische Universität Dresden](#) at [Technische Universität Dresden in the department of Mechanical Engineering](#)
- Participation in international training events and secondments

Equal Opportunities

MGICIAN is committed to equal opportunities and diversity in line with the European Charter for Researchers. We encourage qualified women to apply to increase female representation. Additionally, disabled applicants (m/f/div) will receive preferential consideration if they meet the requisite qualifications. Promising candidates will be invited for an online interview.

Where to Apply

Applications must be submitted exclusively through the official project website <https://mgician.eu>.

Applications submitted by email will not be considered.

Applicants should prepare:

- Curriculum Vitae (CV)
- Motivation letter
- Copies of academic transcripts and certificates

Contact

For information about this research project and the Doctoral Candidate position, please contact:

Prof. Dr. Kornelius Nielsch (k.nielsch@ifw-dresden.de)

For questions regarding the administrative aspects of the recruitment process, please contact:

Dr. Jamil Ur Rahman (info@mgician.eu)

Additional background information about the host institution and the research group can be found at <https://mgician.eu/>