

Helmholtz Call for Chinese Applicants Interested in Running for CSC 2021 Fellowship

- Helmholtz Centre:** Forschungszentrum Jülich GmbH – www.fz-juelich.de
- Department/Institute:** Jülich Centre for Neutron Science (JCNS),
Quantum Materials and Collective Phenomena (JCNS-2/PGI-4)
https://fz-juelich.de/jcns/jcns-2/EN/Home/home_node.html
- Supervising scientist:** Dr. C. Bednarski-Meinke, Dr. M.H. Hamed
- University for registration or for a future degree:** RWTH Aachen
- Research Field:** Solid State Physics, Condensed Matter Physics, Materials Science
- Position open for:** **PhD Student** **Sandwich PhD Student**
- Title of the research:** Engineering oxide interfaces for coupled magnetic and resistive switching in transition metal oxide heterojunctions

More description of research topic:

This thesis project consists of combining results of two previous projects at our research facility. We have used annealing to achieve the topotactic transition of a ferrimagnetic insulator to a ferrimagnetic conductor phase. (M.H. Hamed, et al., ACS Appl. Mater. Interfaces 2019, 11, 7, 7576). Separately, the transition of a ferromagnetic perovskite structure to the antiferromagnetic brownmillerite phase was obtained, also by annealing. (L. Cao, et al., Adv. Mater. 2019, 31, 1806183). This thesis project will concentrate on electric field switching on coupled systems of ferrimagnetic transition metal oxides to control oxygen diffusion through the interfaces. Applying an electric field promotes oxygen ion migration through the interface. Consequently, the oxygen stoichiometry of the film will change. The goal, by detailed understanding and control of the interfaces properties, is to design a new oxide-based memristive device. Experimental work will comprise of sputtering, PLD and oxide MBE for thin film growth, as well as in-house characterization methods of X-ray scattering and magnetometry. We will also take advantage of the neutron scattering instruments of the Heinz Maier-Leibnitz Zentrum (MLZ) in Garching close to Munich for sample characterization.

Specific requirements:

- Completed study in physics, material science or electrical engineering
- Experience and enthusiasm for experimental lab work
- Interest in exploring the following fields: thin film growth, resistive switching, X-ray scattering, neutron scattering, oxide interfacial phenomena, heterojunctions

Working Place: Forschungszentrum Jülich, Germany (near Cologne)

Earliest Start: September 2021

Language Requirement: Very good knowledge of English language, written and spoken. German language courses are organised in the context of our in-house training program and are free of charge.

Name and Address of the Supervisor: Dr. C. Bednarski-Meinke, Dr. M.H. Hamed,
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