

Postdoc: Exploring electric-field induced alignment in 3D-Printing thermoelectric nanocomposites

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Company: KU Leuven

Location: Leuven

Category: other-general

The candidate must fulfill the following requirements:

Having a PhD degree in Applied Physics or Engineering focused on experimental work in electronic/energy materials, ideally organics. Knowledge of thermoelectrics is a big plus.

Interest for developing physical theoretical models or finite element methods to elucidate the interaction of electric fields and nano-objects.

Extensive experience working in a chemistry lab and hands-on experience in chemical, morphological and electrical characterization of materials, ideally soft materials. Familiarity with thermal characterization is a plus.

Strong publication record (3 or more peer-reviewed papers in Q1 journals, and presentation in at least two international conferences. Participation in a patent writing is a plus); proven track record of teamwork, demonstrated through participation in joint papers or consortium-based projects.

Willingness to navigate an interdisciplinary and fast-paced working environment.

An international profile with experience working in different countries is desirable.

Fluency in spoken and written English is mandatory. Minimum required: IELTS of 7 (no subscore below 6.5) or TOEFL of 94 (no subscore below 22).

Other: please feel free to highlight it in the motivation letter.

Thermoelectrics (TEs) are energy harvesters that convert heat into electrical energy and vice versa. Among the different classes of TE materials, organic TE materials present the advantages of being non-toxic, abundant, printable and mechanically flexible. Therefore, organic thermoelectrics (OTEs) are perfect candidates to power wearable autonomous sensors integrated in smart textiles or even in direct contact with the skin. Such systems can find multiple applications in biomedicine and sports. However, organic thermoelectrics suffer currently from low performance, which can be aided by adding nanofillers and forming a hybrid organic-inorganic nanocomposite. Furthermore, performance depends not only on the material itself, but also on the way its molecules are arranged in the solid phase. The hypothesis of this project is that it is possible to use an electric field to access the best solid-state arrangements to boost the thermoelectric performance of thermoelectric nanocomposites. We are looking for a motivated postdoctoral researcher to develop a new fabrication method based on 3D printing in which electric fields are used to modify the morphology of thermoelectric nanocomposites. A theoretical framework based on dielectrophoresis will be developed to understand the E-field induced alignment process and optimize it. Methodologies will be established to characterize the molecular structure of the materials, as well as their electrical and thermal properties to shed light on the morphology-performance relation. The candidate must write scientific publications, present at international conferences, and participate in patents. She/he must also contribute to fellowship and grant writing to develop her/his skills as an independent researcher. The candidate will support the current PhD students in their lab activities and with academic writing. She/he will lead international collaborations when needed. This work will be performed at the FMolina-Lopez group (<https://www.molina-lopezresearchlab.com/>), within the "Surface and Interface Engineered Materials" unit at the Department of Materials Engineering of KU Leuven, and under the direct supervision of Prof. F. Molina-Lopez. The position includes competitive salary, medical care, and research and conference expenses for: 1 year for postdoctoral researchers (with possibility to extend 1 more year). We offer an exciting environment where to thrive as an independent researcher. Boasting 600 years of history, KU Leuven ranks among the top 55 universities in the world (top 13 in Engineering in Europe) according to the Times Higher Education ranking 2024, and ranks #7 (top in Europe) in the World's Most Innovative Universities ranking elaborated by Reuters. KU Leuven offers an exciting multi-disciplinary research environment, top-notch facilities, and a broad range of training courses for staff. Located in Belgium, at the heart of Europe, and

less than 3 hours by train from Paris, London or Amsterdam, Leuven is a cultural and historical city with a vibrant international student lifestyle.

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