



## **Post-Doctoral Opening in Mechanics of bonding in Solar Cells. Mechanical Engineering program**

The Division of Physical Sciences and Engineering at King Abdullah University of Science and Technology (KAUST), Saudi Arabia, invites applications for Postdoctoral fellow in Mechanical Engineering at the Mechanics of Composites for Energy and Mobility Lab. (MCEM, <https://composites.kaust.edu.sa>).

### **Field of study**

A Postdoctoral opening is available in the area of bonding engineering for solar cells.

Perovskite solar cells (PSCs) have demonstrated an unprecedented surge in power conversion efficiency (PCE) in the last decade, having quickly become a leading thin-film photovoltaic (PV) technology.

However, for commercialization, these devices ultimately need to be integrated into PV modules, which poses significant technological challenges that we confront in this project. Such structures are especially prone to delamination due to on-site thermal stresses or process-induced shrinkages.

**The main goal of this project is to develop innovative mechanical testing and modeling in order to improve the understanding of the delamination mechanism in tandem solar cells. Main challenges are the development of representative mechanical tests, at the micro scale, and the translation of mechanical conclusion into design principles.**

The project will be organized around 2 main activities:

- Supporting our partners (collaboration with a leading European University) by performing relevant tests providing meaningful and well-quantified data,
- Developing new testing methodology that would be more relevant to the special situation of delamination in laminated solar cells systems.

### **Qualifications**

The successful candidate must hold a Ph.D. in Mechanical Engineering, Material Science or other relevant discipline. He/She must have a strong background in one or more of the following fields: experimental solid mechanics, mechanical testing, fracture, damage mechanics and polymeric materials. The candidate should also have a good knowledge of simulation in Abaqus Standard; an experience in bonding and adhesive technologies is a plus. For any appointment at MCEM, an in-depth knowledge of theoretical mechanics is a firm requirement.

A high level of self-motivation, strong publication record and a good command of oral and written English, the ability to work in a team, as well as alone and good organizational skills are essential.

### Other duties

The Postdoctoral fellow will be actively engaged in student mentoring (directed research, Masters thesis students). He/She will also be in charge of developing further the facilities of the laboratory. The candidate will also be in charge of delivering regular reports related to the associated grant.

### Appointment

1 year, renewable up to three years by mutual agreement. The candidate is expected to join the team as soon as a successful interview has been completed.

### Benefits

In addition to a competitive salary, the successful candidate will enjoy a generous benefit package including medical insurance, on-campus housing facilities, K-12 schools, and outstanding recreational facilities.

### Application Requirements

**Only applications providing all requirements will be considered further. Applicant requirements are as below. They should be numbered and attached to the application in that order:**

- 1- Detailed CV including list of publications, awards, with potential start date.
- 2- Short statement of previous work, title of the post-doc fellowship you apply for, and a description of your vision and of your research plan on that field (the document does not need to be extensive - no more than one A4 page – but should be very high quality. It should clearly highlight a vision of the candidate in the field, a prior understanding of the related literature and the definition of key steps towards innovative results in the field. Special care should be given by the candidate to this document, which is a key element of the decision process towards recruitment).
- 3- Names and contact information of three referees.
- 4- Slides from a recent presentation in a conference or seminar.
- 5- Pdf of a recent publication considered by the candidate as being representative of his research work.

Interested applicants should send their complete application package to Dr. Gilles Lubineau ([gilles.lubineau@kaust.edu.sa](mailto:gilles.lubineau@kaust.edu.sa)) (with a systematic cc to [khathijah.osman@kaust.edu.sa](mailto:khathijah.osman@kaust.edu.sa) and [ahmed.abdelhady.1@kaust.edu.sa](mailto:ahmed.abdelhady.1@kaust.edu.sa))

**PLEASE USE this as the subject of your email: Post Doc MCEM22 – Solar Cells Delamination**

**Note:** Applicant will be evaluated on a rolling basis and closed as soon as the position filled.

### About KAUST and the MCEM laboratory

The **Mechanics of Composites for Energy and Mobility Laboratory** (Composites Lab) is located at King Abdullah University of Science and Technology and is part of the Physical Science and Engineering Division. The Composites Lab started at KAUST in 2009 and is an integrated environment for composite science combining modeling and experimental expertise in a single working environment.

Our laboratory expertise incorporates three main areas:

**Developing advanced materials:** conducting polymer fibers based on conductive nanoparticles or conductive polymers, multifunctional materials for sensing with tailorable piezo resistivity, biomass-based material and bio-inspired interfaces.

**Understanding and predicting the integrity of materials and structures:** tracking the degradation of materials and structures by a variety of characterization techniques (X-ray tomography, full field measurements, high resolution microscopy), non-destructive testing (ultrasounds, acoustic emission) and structural health monitoring (electrical impedance tomography, optical fibers). This research is applicable to a variety of materials ranging from thermoset and thermoplastic laminates to conductive materials for the energy sector. Long-term integrity in aggressive environments, aging for the aeronautical industry and for the oil and gas industry.

**Advancing modeling and computational techniques:** inverse problems for the identification of material parameters based on full-field measurements, combining techniques between non-local and local continuum mechanics to simulate severe crack propagation, multiphysics modeling for aging and integrity of multifunctional materials and simulation techniques for electrically conductive nano materials.

A project at the Composites Lab is characterized by the amalgamation of experimental and computational/modeling mechanics and encompasses people with very different backgrounds to ensure we capture all aspects of these complex problems. In the Composites Lab you will find skills ranging from theoretical mechanics, applied mathematics, computer science to material science and chemical engineering. Our researchers are connected by their common passion for the fascinating potential of composite materials.

The Composites Lab develops and authenticates techniques to achieve better designs of composite material based structures. Much of this research is done in close cooperation with major industrial partners. This ensures a high level of applied research based on advanced theoretical concepts.

**Dr. Gilles Lubineau**

**Principal Investigator of Mechanics of Composites for Energy and Mobility**

**Professor of Mechanical Engineering**