## *Call for #1 Postdoc Position: project SWITCH*

## *Designing responsive surfaces with tunable local topography*

We have a postdoc opening in the area of electro-active materials and structures with a combined focus on experiments and simulations. The project aims at designing and probing experimentally novel synthetic composite systems that are capable to adapt shape in response to different external stimuli (notably mechanical and electrical).

**Project context*:*** Shape-morphing is ubiquitous in natural systems. From plants to animals, living organisms have developed evolved strategies to adapt shape by harnessing mechanical instabilities to perform a variety of primary life functions including e.g. locomotion, predation and reproduction. Inspired by the natural world, our ambition is to design, fabricate and probe experimentally novel responsive surfaces whereby the local topography is controlled via snap-through instability and is reversed using an external electric field. To this end, we plan to employ periodic structures that are assembled with locally bistable dome unit cells with integrated piezoelectric technology (Figure 1). The mechanical metamaterial systems are designed with the help of finite element (FE) simulations, and are then realized via 3D printing for testing under electro-mechanical loading.

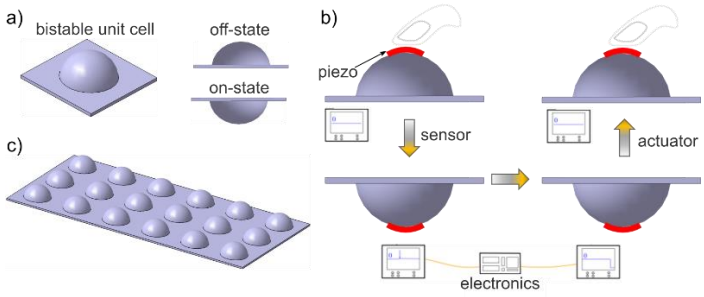


**Figure 1**: a) Bistable dome unit cell with square flat region and its stable states. The convex curvature represents the stress-free *off-state*, whereas the inverted concave curvature defines the *on-state*. b) Selective snapping of the local dome with integrated piezoelectric transducer technology. Snapping into the *on-state* is obtained via tactile feedback, whereas resetting of the inverted dome curvature is achieved via piezo-electric actuation. c) Dome-patterned electroactive composite structures proposed in this study for achieving tunable local topology.

**Your main tasks*:*** You will design (by means of FE simulations), fabricate (via 3D-printing) and test experimentally electroactive composite structures with the goal of exploring shape programmability in response to external electro-mechanical stimuli.

**Your Profile:** Candidates should have recently obtained or are about to receive a Ph.D. in Mechanical/Civil/Materials Engineering, or in Physics. The research is expected to involve a combination of laboratory work and FE modelling. Candidates with an affinity for collaborative work at the interface between experiments and simulations are strongly encouraged to apply. Good communication skills (both oral and written) in English are also necessary.

**We offer:** You will join a diverse research team with interdisciplinary expertise in experimental, computational and theoretical mechanics. You will be hosted at the GeePs at CentraleSupelec and will be supervised by Prof. Laurent Daniel (GeePS, CentraleSupelec), Dr. Gabriella Tarantino (SP2M-ICMMO, Université Paris-Saclay) and Dr. Kostas Danas (LMS, Ecole Polytechnique).

**Funding:** This project is funded by the *LabEx LaSIPS (ANR-10-LABX-0032-LaSIPS)* managed by the French National Research Agency under the *"Investissements d'avenir"* program *(ANR-11-IDEX-0003)*. Gross salary (depending on experience): 2800 - 3000 €/month.

**Starting date:** negotiable, between June and October 2021.

**Duration**: 12-14 months.

**Application material:** Applications should include: (i) a cover letter, (ii) a CV including a publication list (please highlight the two most relevant publications) and (iii) the contact information of 2 referees. The application dossier should be sent to:


- Prof. Laurent Daniel laurent.daniel@centralesupelec.fr
- Dr. Gabriella Tarantino gabriella.tarantino@universite-paris-saclay.fr
- Dr. Kostas Danas konstantinos.danas@polytechnique.edu


**Contact**: Interested candidates are strongly encouraged to contact Dr. Gabriella Tarantino for further information.