**Generalized continuum modeling of tailor-made auxetics**

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Cellular materials can be made compliant by having a bending dominated topology. This has led to the development of auxetic materials which are characterized by a negative Poisson's ratio, i.e. materials that expand transversally when stretched and contract transversally when compressed. Auxetics are expected to exhibit enhanced mechanical properties such as shear modulus and fracture toughness, indentation resistance and acoustic damping.

This project focuses on the development of a high-strength, lightweight auxetic material. Specifically, the project scope encompasses of the following:

i) to develop a tailored architectural design of auxetics that optimizes the interaction between the bending and stretching mechanisms at the micro-scale;

ii) to venture into the elastic-plastic behaviour of auxetics, an emerging topic of which the advantages have yet to be fully exploited;

iii) 3D proto-typing of the developed auxetic material;

iv) to develop and implement a higher order generalized continuum that captures the interplay between the characteristic microstructural and structural length scales, in the regime where there are strong interactions across different length-scales (e.g. deformation of thin devices, localized macroscopic deformation);

v) to capture the boundary effect of the auxetic material via the higher order boundary conditions (e.g. at the skin-foam interfaces of sandwich structures);

vi) experimental characterization using multi-axial loading and digital image correlation.

We are seeking 2 post-doctoral fellows for this project. The two fellows are expected to work closely with one another on the development of the auxetic material, its prototyping, the theoretical model and experimental validation. Broadly speaking, one fellow will work on topics (i) – (iii), the other on topics (iv) – (vi).

The candidates should have a PhD in solid mechanics, mechanical engineering or any related field. He/she is expected to conduct some experimental work. Prior experience in at least one of the following areas is required

- Auxetics
- Higher order continuum theories
- Finite element implementation

The project will be based in the National University of Singapore led by Dr Leong Hien Poh, done in close collaborations with Professor Samuel Forest (Mines ParisTech, France) and A/Professor Justin Dirrenberger (Conservatoire National des Arts et Métiers, France). Experimental work will be conducted in France. There will also be short visits to France to work closely with the collaborators' group.

The project will start in Jan 2016. The contract is for a period of 12 months, with possibility of extension. Salary package and benefits are competitive and commensurate with experience, see http://www.nus.edu.sg/careers/whatyougettoenjoy.html

To apply, please send a single pdf file including cover letter, CV, a full list of publications and the contact details of 2 references, to the three following email addresses:

- Leong Hien Poh: ceeplh@nus.edu.sg
- Samuel Forest: samuel.forest@mines-paristech.fr
- Justin Dirrenberger: Justin.DIRRENBERGER@ensam.eu