

## **6-months trainee position**

In collaboration between

*Centre for Materials Forming (CEMEF) of Mines ParisTech, Sophia Antipolis, France  
and*

*The Institute of Physics of Nice (INPHYNI), Sophia Antipolis, France  
and*

*Institute of Molecular and Cellular Pharmacology (IPMC), Sophia Antipolis, France*

### **Fluorescence amplification in bio-aerogel**

#### Project description

Fluorescence is widely used in biology and medicine for the detection, quantification and imaging of various structures. However, detect rare “markers” remains a challenge, and various amplification options are under research. One of the directions is using the physical principle of random lasers and the multiple scattering of light. As fluorescence detection is targeted to bio-medical applications, non-toxic components should be used. So-called biological lasers that use biological conditions is now a hot topic.

In this work we want to use new fully bio-based materials, bio-aerogels, to act as fluorescence amplifiers. Bio-aerogels are ultra-light, highly porous and nanostructured materials based on natural polymers that are biocompatible. Bio-aerogels possess a strong potential for a variety of applications in life sciences and in biomass valorisation.

The goal of this work is to prepare bio-aerogels and test them as fluorescence amplifiers.

In this internship, the student will prepare aerogels from cellulose solutions incorporating particles with very high refractive index. Density, morphology and specific surface area of aerogels will be characterised. Fluorescence intensity will then be measured and correlated with aerogel properties.

The work is at the at the frontier of materials’ science and physics (interactions light/matter, scattering). It will involve the use of various techniques, including formulation, rheology, optical and electron microscopies, aerogel characterisation and fluorescence spectroscopy.

Most of the work will be performed in CEMEF in close collaboration with two neighbouring Institutes, IPMC and INPHYNI. CEMEF is world leader in the development of biomass-based materials, in particular, of bio-aerogels. INPHYNI is well-known for its work in optical physics and the IPMC is specialized among others, in neuroscience, ion channels at the central or peripheral level; the understanding the role of the non-coding genome, the curvature of cell membranes, etc.

Keywords: aerogels, fluorescence, scattering.

Skills: knowledge in polymer physics and in optics, capability to work in group, motivation and sense of initiative and capability to report regularly on his/her work.

Duration: 6 months

Gratification: about 550 €/month.

The position is available any time starting from March for 6 months.

Application:

The position is for an undergraduate student, at the level of the final Master degree project. Expertise in physics, chemical physics of materials, and/or materials engineering is expected.

Please send your CV, motivation letter, your marks from the last two years and email of a reference person to Tatiana Budtova, CEMEF, tel : +33 (0)4 93 95 74 70; email : [tatiana.budtova@mines-paristech.fr](mailto:tatiana.budtova@mines-paristech.fr)

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