

### Call for M2 internship

**Laboratoire : Laboratoire de Physique de la Matière Condensée**

**Adresse : Ecole Polytechnique, 91128 Palaiseau (France)**

**Directeur du laboratoire : Mathis PLAPP**



**Responsable(s) du stage : Anne Chantal Gouget**

<https://pmc.polytechnique.fr/spip.php?article123>

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### *Biosensors for detection of bacteria using fluorescence*

Rapid and accurate detection of pathogens is a major challenge in many areas including health, food safety or military applications. In the past decades the interest on miniaturization and development of biochips for detection of bacteria is continuously increasing. The advantages are multiples: simple handling, small amount of samples, reduced assay time...<sup>[1]</sup>

We aim to develop a new architecture of the biochip and to use fluorescence for detection of pathogens. A biosensor for detection of proteins using fluorescence was already developed in our laboratory and multivalent interactions between lectins (which are proteins found on bacteria) and sugars were studied. The biochip designs are mainly based on amorphous silicon-carbon alloy  $a\text{-Si}_{1-x}\text{C}_x\text{:H}$  and plasmonic nanostructures. Briefly, the  $a\text{-Si}_{1-x}\text{C}_x\text{:H}$  layer allowed the reproducible fixation of different probes (mainly mannosides) *via* robust covalent Si-C bonds<sup>[2]</sup> and the plasmonic nanostructures were responsible for the exaltation of fluorescence of the targets.

The focus during the internship will be on the development of the biosensor layer by layer, the study of grafting mannose as probes, the attachment of bacteria (tests with different concentrations of bacteria) and tests with fluorescent mannose to reveal the attached bacteria. Different blocking agents will be also studied in order to avoid the non-specific adsorption of bacteria or of the fluorescent sugars.

**Technics:** thermal evaporation, PECVD (plasma-enhanced chemical vapour deposition), fluorescence, RAMAN

**Candidates:** We would like to receive in our team a motivated student with background in physics/chemistry with initiative and fast adaptation skills.

**Rémunération éventuelle du stage : 570 eur/net**

**Possibilité de poursuivre en thèse ? oui**

**Si oui, mode de financement envisagé : bourse doctorale**

<sup>[1]</sup> H. Zhou et al., *Anal. Chem.* 2014, 86, 1525-1533

<sup>[2]</sup> J. Yang et al., *Anal. Chem.* 2014, 86, 10340-10349