

Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage

Date de la proposition : 08/10/15

Responsable du stage / internship supervisor:	
Nom / name: Schwob Tél : 01 44 27 46 51 Courriel / mail: schwob@insp.jussieu.fr	Prénom/ first name : Catherine Fax :
Nom du Laboratoire / laboratory name:	
Code d'identification : UMR 7588 Site Internet / web site: www.insp.jussieu.fr Adresse / address: 4 place Jussieu, 75005 Paris	Organisme : Institut des NanoSciences de Paris
Lieu du stage / internship place: campus Jussieu, tour 22/32, 5 ^{ème} étage	

Titre du stage / internship title: Optical sensor for the detection of nanoparticles
Résumé / summary This internship, at the interface between optics and chemistry, will take place in the group «Nanostructures et Optique» of the Institut des NanoSciences de Paris. Nanoparticles are extensively present in our very-day life. Indeed, due to the particular properties induced by their small size, they are used in many fields such as food, clothes, painting and cosmetic manufacturing. The quantity of nanoparticles soluble in water and consequently salted out in aquatic environment is impressive and, due to their small size, they cannot be filtered by sewage treatment plant. A particular challenge lies on the measurement of the exposure to nanoparticles with selective recognition and ability of size measurements. The purpose of this internship is to develop a sensor of nanoparticles (silica and titanium oxide), based on imprinted polymers and photonic devices such as photonic crystal or micro-textured silicon surface (periodically-arranged arrays of silicon pillars or randomly- arranged micro-structured black silicon) with an optical detection. The principle of recognition is based on the imprint of the target nanoparticle in a hydrogel polymer: the nanoparticle leaves specific nano-cavities within the polymer. The nano-cavities reuptake the imprinted nanoparticle, leading to a swelling of the polymer and a modification of its dielectric constant, dependent on the target particle concentration. If the imprinted polymer is infiltrated in the photonic crystal or in the sub-micron-patterned silicon structure, strong effects are expected on both reflectivity and emission pattern, due the swelling of the polymer and the resulting modification of its dielectric constant in the presence of the target nanoparticle. These modifications can be detected optically on reflection or fluorescence. This project is mainly experimental. The applicant will work on the different parts of the project from the synthesis of the photonic crystals (and of the silica spheres composing the opal template) by soft chemistry methods to the structural characterization and the optical study of the samples. The optical part will mainly consists in angle-resolved reflection spectroscopy and photoluminescence spectroscopy.

Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? : yes			
Si oui, financement de thèse envisagé/ financial support for the PhD: Ecole Doctorale			
Lumière, Matière, Interactions	X	Lasers, Optique, Matière	X

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