

MASTER Recherche
2^{ème} année
Proposition de stage 2008/2009

Laboratoire: Unité Mixte CNRS/Saint-Gobain (Surface du verre et interfaces (SVI) - UMR125)

Adresse: 39 quai Lucien Lefranc, BP 135 - 93303 Aubervilliers Cedex

Directeur du laboratoire : Elin SONDERGARD

Responsables du stage: Jérémie Teisseire et Etienne Barthel

Téléphone: 01 48 39 55 41 (J. Teisseire), 01 48 39 55 57 (E. Barthel) - **Fax :** 01 48 39 55 62

e-mail: jeremie.teisseire@saint-gobain.com , etienne.barthel@saint-gobain.com

Titre du sujet proposé : Nanoimprint of porous sol-gel coating.

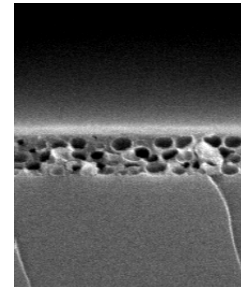
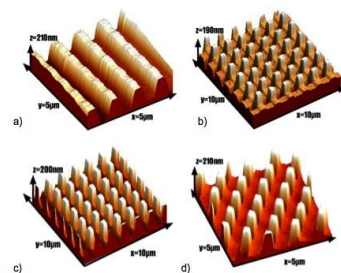
Scientific plan:

Patterning of surfaces at the sub-micrometer scale is a key factor for the emergence of a wide variety of applications from physics to biology. Nano Imprint Lithography (NIL) has emerged as a promising technique to replicate nanostructures. NIL basically consists on the solidification of deformable surfaces or films in contact with a structured stamp. A different method to structure material is to incorporate porosity in the coating. This method appears as a good way to tune the optical properties.

Inorganically cross-linked sol-gels (ICSG) appear as very attractive materials for both previous structuration techniques due to their low initial viscosity and outstanding thermal, chemical and mechanical stability.

In the laboratory, we have developed a one-step, fast and potential low cost process to make silica like glass nanostructures by combining sol-gel chemistry and thermal nanoimprint. Besides, sol-gel coatings with latex nanoparticles are studied to generate porous coatings in order to analyse their chemical and mechanical stability.

We propose to combine these two approaches to nanoimprint sol-gel porous coatings. The impact of latex nanoparticles on NIL process and condensation step will be studied. Besides, we aim to control the porosity after embossing. Finally, by using NIL to nanoimprint microfluidic patterns and porosity as a second structuration of walls, the slipping conditions for microfluidic applications should be controlled.



The objectives of these training are:

- to control the impact of physical parameters on NIL process (load, temperature, time, concentration and size of nanoparticles),
- to characterize porosity and mechanical behaviour of coating (viscosity and plasticity),
- to collaborate with DTU (Danemark) for microfluidic applications.

Used techniques: NIL, MEB, AFM, ...

Possibilité de poursuivre en thèse ? **Oui.** Mode de financement éventuel de la thèse ? **Cifre**

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