
Optimising dewetting conditions for high contrast plasmonic imaging

Context

The rapid and reliable detection of pathogens in complex clinical samples represents a major challenge and priority in diagnostic medicine. The **Symmés** laboratory at CEA-IRIG is developing a diagnostic platform based on high contrast plasmonic imaging (HCPI) to detect and quantify the load of biological particles in liquid samples. For this the particles are specifically captured in solution and their subsequent detection is performed in air.

Project description

The HCPI platform is based on a microfluidic system allowing to flow liquid samples over a functionalized gold-coated prism coated with antibodies that specifically bind targeted particles. Subsequently air is injected to completely drain the liquid from the sensing surface. The replacement of water by air dramatically changes the local refractive index, allowing the captured particles to become visible and quantifiable in gas-phase SPR imaging mode.

In collaboration with the LMGP laboratory, specializing on the behaviour of biomolecules at solid-liquid-air interfaces, the research objectives of the project are to:

- investigate and understand the physico-chemical parameters governing the dewetting process
- optimize the HCPI performance for biological particle detection

For this, different physico-chemical parameters will be investigated by experimental and modeling approaches. The candidate will work in collaboration with researchers from the two laboratories Symmes and LMGP, and will be in contact with a recently created start-up company.

Scientific environment

Symmés (Systèmes Moléculaires et nanoMatériaux pour l'Énergie et la Santé - UMR 5819 CEA-CNRS-UGA-Grenoble INP) located on the CEA-Grenoble site. The Symmes aims to develop basic research on themes with strong societal issue: zero-carbon energy, information and communications technology (ICT), biotechnology and human health. <https://www.symmés.fr/>

LMGP (Laboratory of Materials and Physical Engineering) is a joint research unit (UMR 5628) of CNRS and Grenoble INP within Université Grenoble Alpes, located at the Minatec site in the PHELMMA (Physics, Electronics, Materials) engineering school buildings. The NaBioS team of LMGP specializes in engineering of nanomaterials and biomolecules at surfaces and interfaces. Laboratory website: LMGP (<http://www.lmgp.grenoble-inp.fr/>)

Profile & requested skills

The projet is suitable for Master or Engineer student in biophysics or biomedical engineering. Applicants should enjoy experimental research and have an interest in interdisciplinary projects at the interface between physics, chemistry, biology, and biomedical diagnostics. The project addresses both fundamental scientific questions and practical challenges in rapid clinical diagnostics.

Contacts

Interested candidates should contact Thierry LIVACHE (thierry.livache@cea.fr) and Marianne WEIDENHAUPT (marianne.weidenhaupt@grenoble-inp.fr)

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