*Internship MEM*

## Nanostructured Materials for Enhanced Plasmonic Imaging

There is currently an increasing interest in combining the research fields related to **plasmonics** and sensing. Sensing systems are becoming more and more important in our society and require everyday more efficient platforms. The need for more specific, sensitive yet reliable and low cost systems is a strong driving force. In particular, these tasks of recognition and characterization of target materials have to be performed at the molecular level making use of as little starting biomaterials as possible. Such needs for multiplex sensing, requiring Lab-on-a-Chip capabilities, involve a wide variety of domains ranging from **biological to medical, environmental applications** as well as industrial process control, and food quality assessment.

Surface plasmon resonance sensors are at the merging point of these two domains, plasmonics and sensing. They offer the capability of monitoring the actual biomolecular interactions between probes localized on a surface and target molecules in a sample solution without requiring any labeling.

In this proposed work, we will conduct fundamental investigation and develop a new generation of **nano- and micro- structured** plasmonic materials that will have important applications in the field of plasmonics-active biochip systems based on surface plasmon resonance imaging. We propose first to conduct fundamental studies and modeling of novel nano- and micro- structured plasmonic materials, then to design and fabricate these novel nano- and micro-structured plasmonic materials, and finally to characterize their structural and plasmonic properties. The objective of developing these novel plasmonic substrates is to obtain a better understanding of plasmonics properties of these materials in order to improve the sensitivity of surface plasmon resonance imaging based sensors that detect changes in the localized refractive index caused by biological binding events such as DNA-DNA hybridization, antigen-antibody binding, etc.

This work will be conducted in the **Macsybio group** at the Institut d'Optique Graduate school.

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