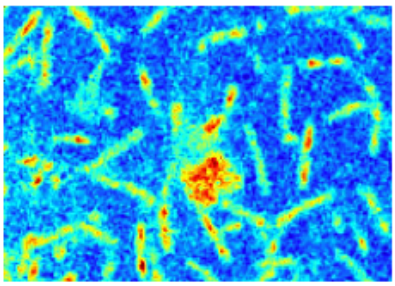
Bacterial Biofilm Compressive Raman Imaging

Joint project from Laboratoire Jean Perrin (LJP) and Laboratoire Kastler Brossel (LKB), Biophysics of Micro-Organisms and Optics of Complex Media groups.

PhD, Post-doc, Engineer


Bacterial biofilms are living structures formed by bacteria that attach to surfaces and embed in a self-secreted extracellular matrix (ECM). They have a major impact on human activities and geochemical cycles. We are currently developing a project, aiming to decipher the principles of bacterial biofilm assembly. Jointly supported by LKB and LJP, the objective is to achieve a time-resolved functional mapping of a developing biofilm implementing a combination of conventional and compressive Raman micro-spectroscopies assisted by the use of stable isotope probes (SIP) and complemented by a multiparametric computational analysis. This hybrid strategy should allow a kinetic approach to the biofilm assembly processes from the single cell to the built-up two- and then three-dimensional stages. An AI strategy intended to decipher cell-ECM couplings up to the mature biofilm stage will be implemented. We will start by imaging a simple model biofilm of *Escherichia coli*, then strains of medical and environmental interest such as *Pseudomonas aeruginosa* or *Bacillus thuringiensis*. In the longer term, the completion of the project should make it possible to address the more complex question of the multi-species communities functioning, a key subject of modern microbiology.
This work will require the implementation of microbiology, microfabrication, millifluidics techniques, together with Raman micro-spectroscopy as well as algorithmic processing and modeling approaches in proportions which will depend on the recruited profiles.

Profiles: For this interdisciplinary ANR- funded project, we are recruiting for two PhD, Post-doc and/or engineer fellowships, with physicist and physico-chemist backgrounds trained at the interface with biology. Biologists with strong experience in imaging and quantitative analysis may also be considered. Experience in Raman spectroscopy would be greatly appreciated.

Location: The two host laboratories are located in the 5th arrondissement in the center of Paris and approximately 15 min walk.

Recruitment: Candidates will be recruited in one or the other of the two laboratories according to their profile with a main assignment but they will work in both laboratories. The salary will depend on the level (approx. between €2100 and €3600 gross salary). CVs with 2 recommandation letters are welcome by email at the following contacts. Interviews will begin mid-september 2024 for a flexible hiring date no earlier than November 1, 2024.

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References:

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