BioMérieux-funded six-month internship in Lyon, France

Connecting molecular structure

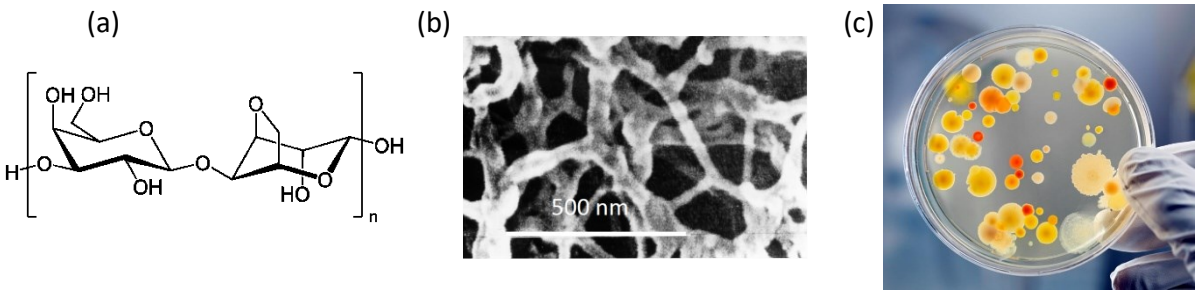
and macroscopic adhesion properties in agarose gels

Hydrogels are mainly composed of water and contain only a few percent in mass of natural or synthetic polymers linked together either by covalent bonds or by physical interactions such as hydrogen bonds. In both cases, polymers form a fibrous, sample-spanning network responsible for the gel elastic behavior under small deformation. As such, hydrogels are soft viscoelastic solids commonly encountered in nature, as exemplified by hagfish slime, and lie at the core of numerous industrial applications such as scaffolds for tissue engineering, controlled drug release, and growth culture media – the so-called agar plates.

Since the introduction of agar plates in the 1880s — which enabled researchers to isolate tuberculosis, cholera, and other disease-causing bacteria for the first time — bacteriological agar has been derived from a clutch of red seaweed species. Due to its natural origin, agar properties, including its ability to gel, its water retention capacity, and its adhesion properties, show a strong variability depending on the seaweed geographical source.

The purpose of this 6-month internship is to link the macroscopic properties of an agarose gel and the microscopic specificity of the agarose molecule, the gelling agent in agar originating from various seaweeds. The goal will be to answer the following question: **how do the agarose molecular chemical properties influence the gel physical properties, especially the gel adhesion properties to various surfaces?** The intern will answer to this question through mechanical tests, microscopy, diffusion light scattering, and chemical characterization (e.g. chromatography).

(a) (b) (c)



(a) The structure of a repeating unit of an agarose polymer; (b) Electronic micrograph of a 2% agarose gel; (c) growth culture media composed of agarose.

The internship will take place at the Physics Laboratory, at Ecole Normale Supérieure in Lyon. Candidates should hold a L3 degree in Physics, Physico-Chemistry, or Material Science, and have excellent interpersonal, written, and oral communication skills. For further information and application, please contact:

Dr. **Thibaut Divoux** thibaut.divoux@ens-lyon.fr
Prof. **Sébastien Manneville** sebastien.manneville@ens-lyon.fr

Applications should include a cover letter, your CV, and your academic transcripts.
The closing date is 31/12/2020 with an ability to start the internship until March 2021.