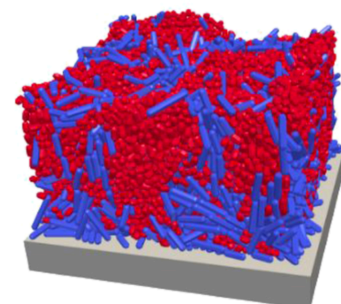


Research topic	Modelling bacterial populations & biofilms in heterogeneous environments.
Lab	Institute of Fluid Mechanics, Allee Camille Soula, 31400 Toulouse, France.
Salary	PhD: about 20.000 euros net / year (funding for 3 years). Postdoc: between 25.000 and 40.000 euros net / year depending on experience (funding for 2 years).
Funding /Project	European Research Council. ERC Starting Grant. Project BEBOP.
Main supervisor	Yohan Davit, yohan.davit@imft.fr , tel: +33 5 34 32 28 82.
Dates	Applications until fulfilled.
Example publication	Cell morphology drives spatial patterning in microbial communities. WPJ Smith, Y Davit, J Osborne, W Kim, KR Foster and J Pitt-Francis. PNAS (2017).
Background	Applied mathematics, or physical modelling, or fluid mechanics.
Other	For more info about research activities @ IMFT, http://yohan-davit.com

Context. This Postdoc/PhD is part of a large project (BEBOP, 2019-2024) funded by the European Research Council. The goal of BEBOP is to figure out how we can use bacteria to control the properties of porous structures (e.g. porosity, permeability). We envision that this will unlock a new generation of biotechnologies, such as self-repairing construction materials or self-cleaning bioreactors. The main scientific obstacle to this technology is the lack of understanding of the biophysical mechanisms associated with the development of bacterial populations within complex porous structures. Therefore, the first scientific objective of BEBOP is to gain insight into how fluid flow, transport phenomena and bacterial communities (biofilms) interact within connected heterogeneous structures. To this end, we will combine microfluidic and 3D printed micro-bioreactor experiments; fluorescence and X-ray imaging; high performance computing bringing together CFD, individual-based models and pore network approaches. The second scientific objective of BEBOP is to create the primary building blocks toward a control theory of bacteria in porous media and to construct a demonstrator bioreactor for permeability control.

Role. The successful applicant will develop innovative models of the growth of bacterial communities in porous structures. We want to create a high performance computing framework for the simulation of bacterial communities, including couplings between the mechanics of the community, transport phenomena (nutrients, molecular signalling) and fluid flow. The code will use [PELICANS/CALIF3S](#) for CFD (collaboration with J.-C. Latché). The actual research is flexible. It will be directly linked to experiments being performed during the project (microfluidics & bioreactors) and can be adapted to the expertise of the successful candidate. I am looking for somebody extremely motivated who will be fully involved in the project and in the group (2 PhDs + 2 Postdocs starting in 2019, other positions will also be opened later on).



Model of bacterial colony (bacillus in blue, coccus in red) from Smith et al., PNAS (2017)

How to apply? Please apply on emploi.cnrs.fr.

- Postdoc: <https://emploi.cnrs.fr/Offres/CDD/UMR5502-YOHDV-002/Default.aspx?lang=EN>
- PhD: emploi.cnrs.fr/Offres/Doctorant/UMR5502-YOHDV-003/Default.aspx?lang=EN

You can e-mail me at yohan.davit@imft.fr for specific questions.