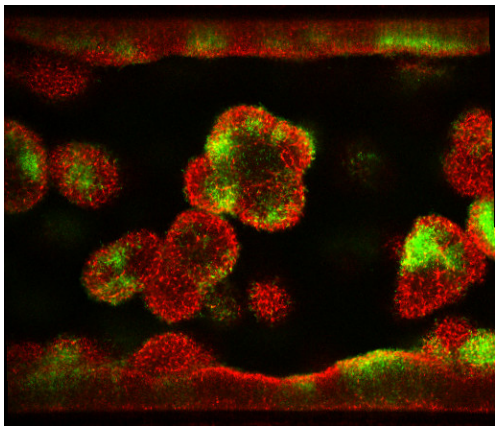
Postdoctoral research associate

Research topic	Microfluidic study of the biophysics of bacterial populations in porous media.
Lab	Institute of Fluid Mechanics, Allee Camille Soula, 31400 Toulouse, France.
Salary	Between 25.000 and 40.000 euros net / year depending on experience.
Funding /Project	European Research Council. ERC Starting Grant. Project BEBOP.
Duration	The offer is for 2 years, and can be extended for 1 additional year.
Supervisors	PI Yohan Davit, yohan.davit@imft.fr. Co-supervisors: Olivier Liot & Paul Duru. Collaborators: Anne-Marie Gué (microfluidics), Christine Roques (microbiology)
Dates	Applications until about April 2019.
Background	Biophysics, or Microfluidics, or Microbiology.
Other	For more info on research activities & papers @ IMFT, http://yohan-davit.com

Context. This PDRA 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 PDRA will develop a microfluidic porous system and use microscopy approaches to visualize the dynamics of bacterial growth, velocity and oxygen fields inside the porous structure. The PDRA will then use this system to study the biophysics of: 1) protozoan predation inside the porous structure, and 2) couplings between biofilms and transport mechanisms, first focusing on molecular signalling and the patterns of quorum sensing activation in the porous structure. The work will be done in collaboration with microbiologists for the preparation of mutants and a national micro-fabrication platform (LAAS-CNRS) for the microfluidics. The research can be adapted to the expertise and interests 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 + 1 postdoc starting in 2019, additional positions will also be available later on in the project).



Morphology of a P. aeruginosa biofilm (expressing GFP and tagged with con A – rhodamine) growing inside a capillary tube and imaged using two-photon laser scanning microscopy.

How to apply? Apply online with a cover letter, a CV and copies of transcripts at:
https://emploi.cnrs.fr/Offres/CDD/UMR5502-yohdav-001/Default.aspx?lang=EN
Please note that you can switch the whole website between English and French by clicking on the flags at the top right of the page. In any case, do not hesitate to contact me directly at yohan.davit@imft.fr (please indicate ERC_BEBOP_PDRA_Microfluidics in the e-mail title).