



**POST DOCTORAL POSITION AVAILABLE  
from September 2015**

***Local Tissue rheology of 3D MultiCellular Spheroids  
using novel hydrogel probes***

**Biophysics Team, Institute of Light and Matter (<http://ilm.univ-lyon1.fr>)  
Université Claude Bernard Lyon 1, Lyon, France**

In the framework of an interdisciplinary project of the iMUST Labex program, the Biophysics team of the Institute of Light and Matter (ILM, UMR 5306, CNRS-UCBL, Lyon, France) is opening a postdoctoral research position in cellular biophysics for one year beginning from September 2015 (with a possible 2-year extension on a side project).

Mechanics is playing an important role on cell behavior and fate. It is true for as different processes as embryonic development, blood clotting or tumor expansion in cancer. It is thus now a central aim in the biophysics field to get a proper rheological description of tissue in order to understand all these behaviors and disentangle mechanics versus genetics cues. One idea is to introduce inside living tissues well controlled soft probes whose deformations will give us access to the local mechanical fields. Tailored polymeric probes will be developed thanks to a new collaboration started in the beginning of year 2015 between ILM, Laurent David at IMP (Ingénierie des Matériaux Polymères, UCBL) Yves Jorand at (MATEIS, INSA de Lyon) within the project SPIMOGEL supported by the iMUST Labex.

As model tissues, we will use MultiCellular Spheroids (MCSs), which are tridimensional assemblies composed of thousands of adhesive living cells, and which reproduce the *in vivo* biochemical and mechanical microenvironment, and have also been thoroughly investigated in the Biophysics team<sup>1</sup>.

The candidate will use 2-photon confocal microscopy available in the host laboratory and Single Plane Illumination Microscope developed by Cedric Ray of team ONLI (ILM) within the SPIMOGEL project. Data analysis and modeling will be done in close collaboration with François Graner (MSC, Paris Diderot).

Qualified candidates should have a PhD in Biophysics, Cellular Biology or Soft Matter Physics with an experience in cell culture and/or cell biophysics and/or cell biology, development. Experience in physico-chemistry of polymers, microfluidics, image analysis or 3D microscopy will be appreciated.

Send your CV with cover letter, and the names of referees familiar with your work to: Hélène Delanoë-Ayari ([helene.ayari@univ-lyon1.fr](mailto:helene.ayari@univ-lyon1.fr)) & Jean-Paul Rieu ([jean-paul.rieu@univ-lyon1.fr](mailto:jean-paul.rieu@univ-lyon1.fr))

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<sup>1</sup> P. Marmottant, A. Mgharbel, J. Kafer, B. Audren, J.-P. Rieu, J.-C. Vial, B. van der Sanden, A. F.M. Marée, F. Graner, H. Delanoë-Ayari. The role of fluctuations and stress on the effective viscosity of cell aggregates. Proc. Nat. Acad. Sci. USA 106 (2009) 17271-5.

A. Mgharbel, H. Delanoë-Ayari, J.-P. Rieu. Measuring accurately liquid and tissue surface tension with a compression plate tensiometer". 2009 HFSP Journal, 3 (2009) 213

T. V. Stirbat, A. Mgharbel, S. Bodenec, K. Ferri, H. C. Mertani, J.-P. Rieu, H. Delanoë-Ayari. « Fine Tuning of Tissues' Viscosity and Surface Tension through Contractility Suggests a New Role for  $\alpha$ -Catenin". PLoS One 8 (2013) e52554.

T. V. Stirbat, S. Tlili, T. Houver, J.-P. Rieu, C. Barentin, H. Delanoë-Ayari. « Multicellular aggregates: a model system for tissue rheology » Eur. Phys. J. E 36 (2013) 9898

F. Mazuel, M. Reffay, V. Du, J.C. Bacri, J.P. Rieu, C. Wilhelm. Flattening of stem-cell spheroids with a magnetic force tensiometer indicates a size-dependent elastocapillary transition. Phys. Rev. Lett., 114 (2015) 098105



**POST DOCTORAL POSITION AVAILABLE  
from January 2016**

***Engineering and imaging 3D multicellular assembly: functional assay and application to drug screening***

**Biophysics Team, Institute of Light and Matter (<http://ilm.univ-lyon1.fr>)  
Université Claude Bernard Lyon 1, Lyon, France**

In the framework of an interdisciplinary project financed by the INSERM grants “physics of cancer”, the Biophysics team and the ONLI team (Non Linear Optic and Interface) of the Institute of Light and Matter (ILM, UMR 5306, CNRS-UCBL, Lyon, France) are opening a postdoctoral research position in the engineering and imaging of model tumors for two year beginning from January 2016.

This project aims to associate for the first time 3D multicellular assemblies with new, weakly phototoxic 3D imaging approaches and microsystems mimicking *in-vivo* environment in order to explore drug response on their growth and behaviour. Multicellular tumor spheroid of CRC cell lines with different resistance to chemotherapeutic drugs, as well as, biopsies from mice bearing human CRC tumors and fresh human CRC biopsies obtained from the surgery will be used. We will implement agarose-based microfluidic devices enabling the perfusion of drugs around samples, and the collection of secreted molecules for biochemical analysis. We will develop Single Plane Illumination Microscopy (SPIM) in order to perform long term (days) live imaging of 3D cellular assemblies. Response to chemotherapeutic drugs will be assessed using biological (viability, apoptosis) and biophysical (invasion velocity, 3D cell tracking, collagen remodelling) parameters extracted from time-lapse microscopy.

The candidate will be mainly involved in the biophysical characterization of tumor cell escape mechanisms from multicellular spheroids (image analysis, cell tracking). He (she) will also participate to the final development of Single Plane Illumination Microscope developed by the ONLI team (in particular a sample environment compatible with agarose-based microfluidic devices); and to the validation of the devices for biopsies, in close collaboration with the DNP team of the CRCL (Center Research for Cancer of Lyon, JJ Diaz and H. Mertani).

Qualified candidates should have a PhD in Biophysics, Cellular Biology or Soft Matter Physics with an experience in cell biophysics and/or cell biology, development, and/or optics for biology. Ability to work in a collaborative, multi-disciplinary environment is essential. Experience in physico-chemistry of polymers, microfluidics, image analysis or 3D microscopy will be appreciated.

Send your CV with cover letter, and the names of referees familiar with your work to: Charlotte Rivière ([charlotte.riviere@univ-lyon1.fr](mailto:charlotte.riviere@univ-lyon1.fr)) & Jean-Paul RIEU ([jean-paul.rieu@univ-lyon1.fr](mailto:jean-paul.rieu@univ-lyon1.fr))