Proposition de stage

Encadrantes : Claire Wilhelm / Myriam REFFAY

Laboratoire : Matière et Systèmes Complexes/ Université Paris Diderot

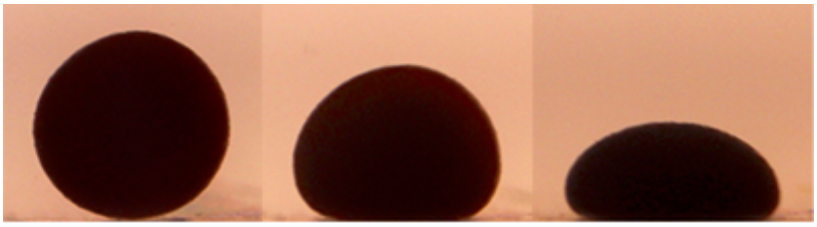
Contact : myriam.reffay@univ-paris-diderot.fr

Téléphone : 01 57 27 70 29

Role of adhesion and extracellular matrix on tissue rheology

During animal morphogenesis, large-scale cell movements occur, involving the rearrangement, as well as the segregation of cell populations. Such phenomena as cell sorting and mutual tissue spreading have been identified with the behaviors of immiscible liquids (1). It has been proposed that tissues actually behave as liquids and possess a characteristic surface tension, a viscosity,… (2-4). But how is tissue surface tension generated? Different hypothesis have been proposed to explain how mesoscopic cell properties such as cell–cell adhesion and contractility of cell interfaces may underlie tissue surface tension (5). In this internship we would like to explore the role of the adhesion strength and the one of the extracellular matrix on tissue surface tension.

Cellular aggregates represent a model system for biological tissues in which cell adhesion may be trigger as well as the expression of extracellular matrix. By incorporating magnetic nanoparticles in cells we add to them magnetic properties without modifying their biological capacities and we are able to drive them wherever we need to form spheroids of controlled size and shape as well as to stimulate them at will using external magnets to explore their rheological properties (6).



Magnetic flattening of cellular aggregates to measure tissular surface tension (6)

This internship at the crossroads of soft matter and cellular biology will focus on establishing correlations between mesoscopic cellular properties and macroscopic tissular parameters.

1. **Steinberg, M.S.** *Science* (1963) **240, 141**.
2. **Manning ML et al.** *Proc. Natl Acad Sci USA.* (2010), **107, 28**.
3. **Marmottant, P.** et al.. *: Proc. Natl. Acad. Sci. USA* (2009), **106**.
4. **T. V. Stirbat et.** ale52554, s.l. : PLoS One (2013), **8**.
5. **J.L. Maître et al.** *Science*, 2012, **253, 338**.
6. **F. Mazuel et al.**, *Phys. Rev. Lett.* (2015**) 114**, 098105.