

Master *Matière Condensée et Nanophysique*

Année universitaire 2023/2024

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Title : Modelling interaction potentials between elastocapillary capsules

Key words: Capsules, Elasticity, Viscoelasticity, Elastocapillarity, General stress decomposition (GSD), Experiment, Theory

Liquid capsules are drops dispersed in an immiscible liquid surrounded by an elastic skin. If the elastic constants of the skin are sufficiently small, the interfacial tension between the two liquids (i.e. capillary forces) play an equally important role in controlling the response of these “elastocapillary” capsules to deformation. While methods to characterise individual elastocapillary capsules already exist, we lack an understanding of their interactions. This understanding is important to model the response of an assembly of capsules.

This internship is therefore dedicated to establishing the interaction potential of two elastocapillary capsules in contact. For this purpose, we will use a recently developed model experiment which consists of two capsules formed at the end of a capillary connected to a pressure sensor. One of the capillaries is fixed on a motorised micro-controller to move the capsule in the three transversal directions. Using a model system of PEG drops covered by a silicone skin in silicone oil, the student will investigate the interaction between the two capsules as a function of the skin properties, capsule shapes/sizes and type of deformation cycles. These experiments will be accompanied by theoretical modelling and computer simulations (Surface Evolver).

The student will be integrated in the daily group life of the Mcube and MIM teams and learn more about research in these two teams beyond their own topic.

