



BME PARIS
BioMedical Engineering
MASTER'S PROGRAM

Sticking to tissues: slippery when wet

Open Your Mind Seminar

Friday, Oct 25 2019
1 pm – 2.30 pm

Arts et Métiers
155 Boulevard de l'Hôpital
75013 Paris
BEZIER amphitheater

Designing adhesive hydrogels for surgical applications

The fixation of hydrogels to soft biological tissues is of outmost interest for numbers of biomedical applications but it is a highly challenging task due to the fragile and wet nature of both hydrogels and tissues. Here, we explore how physical mechanisms occurring at hydrogel-tissue interfaces can be exploited to design bioadhesive hydrogels that are relevant for clinical applications. For that, ex vivo and in vivo experiments were devised to measure the adhesion between model polyethylene glycol hydrogel films and the surface of porcine livers. In a first study, we show that a transition from a lubricated contact to an adhesive contact is governed by the transport of liquid across the tissue-hydrogel interface. This transition is well captured by a simple model describing the wetting and draining of the interface. In a second study inspired by the pioneering works by Leibler and coworkers (Rose et al. Nature 2014), we investigate how tissue-hydrogel adhesion can be created using particles that bridge the interface by adsorbing on both gels and tissues. These results and methods shed a new light on the design of predictive bioadhesion tests.

Laurent CORTE

C3M lab, ESPCI Paris/CdM Mines ParisTech
PSL Research University

