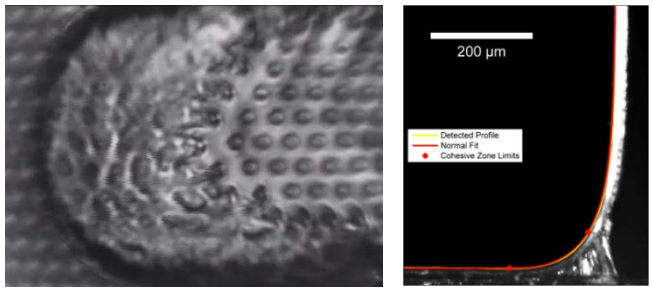
2 year postdoctoral position at Laboratoire de Physique des Solides
(Application deadline 20 November 2016)

Peeling on patterned Surfaces (PoPS)

The tuning of adhesion is of great interest for a number of applications in industrial, medical and even in everyday-life contexts. The theoretical description of the peeling energy of Pressure Sensitive Adhesives remains an open issue in terms of efficient modeling. Several key features have nevertheless been identified such as the soft and viscoelastic nature of the adhesive material, the low thickness of the adhesive layer and its confinement by a rigid backing or the nature of the interaction at the interface with the substrate.



Left: Peeling front on a patterned substrate. Observation from below at the micrometric scale (LPS). **Right:** Side view of the peeling region at the mesoscopic scale (FAST).

Our goal is to investigate the role of the adhesive rheology and of the adhesive-substrate interaction on the peeling energy by tuning the adhesion mechanisms using physically or chemically patterned substrates. Playing on the features of the patterned substrate will allow to modulate the relative contributions of the interfacial toughness, the adhesive viscoelasticity and the adhesive large strain rheology to the peel energy. Part of the post-doc project will be devoted to the fabrication of patterned substrates (array of pillars or walls, sinusoidal wrinkles, …) over large enough scales (cm→dm) using optical lithography, wrinkling instability and chemical stamping. The post-doc fellow will then be able to investigate the impact of the shape, the characteristic lengths and the elastic properties of the patterned substrate on the adhesion to model the peel process, based on a determination of the deformation and the stress fields inside the adhesive layer via microscopic optical methods (Digital Image Correlation and fitting of the shape of the tape backing with Elastica profile modified by a cohesive zone).

These issues will be addressed experimentally at the Laboratoire de Physique des Solides (LPS) in strong collaboration with laboratory FAST both hosted by Université Paris-Sud in Orsay. The post-doctorate position is funded by the Labex PALM.

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