From microdishes to microniches: an engineering approach to control apico-basal polarization

Abstract    The importance of the biophysical cues of cellular microniches in the context of tissue homeostasis and diseases are being rapidly uncovered. We present here a set of new methodological approaches that allows to precisely control in vitro the environmental parameters surrounding 1 to 100 cells in a combinatorial way. Our approach also permits 3D super resolution imaging of cells across the entire cell body. We illustrate how these techniques can be used to induce apico-basal polarity of a single cell in the context of epithelial cells and hepatocytes. Lastly, we explore how local application of mechanical stresses contributes to the localization and maturation of the tight junction belts.

Biosketch    Virgile Viasnoff is a Prof at the Mechanobiology Institute of Singapore and at the CNRS (France). He studies how environmental cues affects cell-cell interactions. He developed an in vitro approach to create artificial microniches that can recapitulate most combinations of environmental parameters at the level of single cells or cell aggregates. He is interested in understanding how epithelial cells organize their junctions and become functional in response the 3D arrangement of the microniche parameters. The interdisciplinary expertise of his lab span biology, physics, material science and applied diagnostics.

References