A Biomaterials Platform to Decouple Cell-Matrix and Cell-Cell Forces

Aleeza Farrukh,[1] Desna Joseph, [1,2] Roshna Vakkeel, [1] Aránzazu del Campo[1,2]

[1] *INM – Leibniz Institute for New Materials. Campus D2 2, 66123 Saarbrücken Germany*
[2] *Department of Chemistry, Saarland University, Saarbrücken, Germany*

Cells apply forces to communicate with other cells and with the extracellular matrix. For this purpose cells form physical contacts with neighbouring cells or the ECM using membrane adhesive receptors. Over the last years different methods have been developed to measure cell forces, like traction force microscopy, micropipettes, micropillar arrays AFM etc. None of these methods allows independent measurement of cell-cell and cell-ECM forces independently and in a monolayer-like geometry with spatially segregated cell-ECM and cell-cell receptor complexes, as it occurs in natural epithelium.

We present a biomaterials platform to mimic the epithelial cell niche and spatially confine cell-cell and cell-ECM interactions using PAAm Gels with a novel design. They allow site-independent immobilization of cadherin and fibronectin peptidtidomimetics and independent modulation of their mechanical link. These platforms represent advanced substrates for measuring cellular forces.

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