## **Biointerface Lab, QMUL** GENERAL PRESENTATION

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- ✓ **Complete denomination**: Biointerface Laboratory, QMUL.
- ✓ Location (city, country): London, UK
- ✓ **Director**: Dr Julien Gautrot
- ✓ Contact person in NEWGEN: Dr Julien Gautrot
- ✓ Working Group involvment: WG1
- ✓ Staff: 4 Postdocs and 9 PhD students

✓ Research topics: Peptide-based hydrogels, composite hydrogels, polymer brushes, nanomaterials, mechanotransduction.

Researchers expertises: Polymer chemistry, biomaterials characterisation, surface chemistry and characterisation, cell adhesion, stem cell culture and differentiation.



Biointerface lab at QMUL QMUL, SEMS Mile End Road E1 4NS, London - UK



## **Biointerface Lab, QMUL**

## **Summary of Lab Activities and Expertise**

### **Controlling 2D interfaces using polymer**

brushes





#### • Micropatterned single cells and cell clusters for cellbased assays.

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- Nanopatterned matrices controlling cell adhesion and growth factor capture.
- Cell sheet engineering.

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### Peptide-based hydrogels as 3D artificial



- Cell-ladden gels for **tissue** engineering.
- 3D matrices for "organ on a chip".





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### **3D Peptide-Based Artificial ECM Hydrogels**





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## *Biointerface Lab, QMUL* Design of Hydrogel Chemistry



#### Impact of the chemical microenvironment on thiol-ene chemistry



- Microenvironmental factors such as pH and the presence of some functional groups can affect the efficiency of the reaction.
- Coupling levels remain high in a wide range of experimental conditions.





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## **Hydrogel Mechanical Characterisation**

#### **Tunable hydrogels**

- Fast gelation of hydrogels in physiological conditions.
- Tunable mechanical properties and reactivable crosslinking.
- Controlled by UV (and potentially visible light).





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#### **Structural characterisation**





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## **Biointerface Lab, QMUL** Cells and their Physical Environment

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#### Degradability

Stiffness



# Sensing of the nanoscale geometry of the ECM



- Study of the role of biomaterials mechanics (in particular at the nanoscale and during matrix remodelling) impacts on cell phenotype.
- Mechanisms via which cells sense the nanoscale geometry of biomaterials.







- Development of assays for the study of stem cell differentiation in vitro (study of the impact of matrix biophysical properties).
- Quantification of cell adhesion via advanced live microscopy (FRAP, quantitative analysis of adhesion distribution and cytoskeleton assembly).



histogram

