

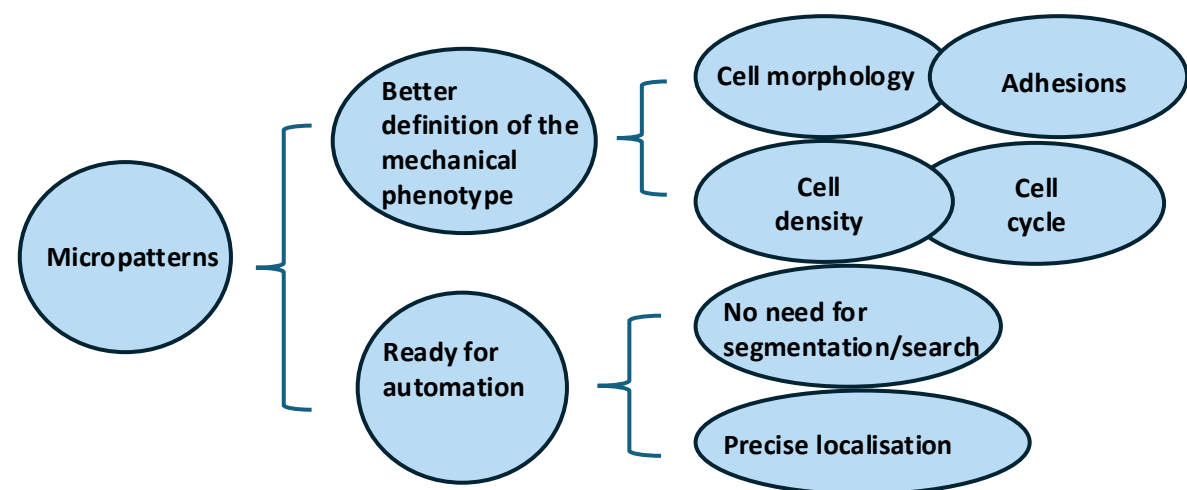
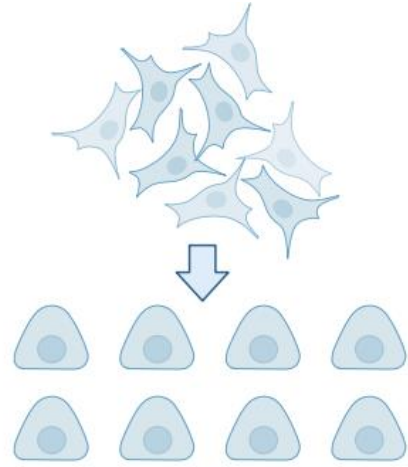
## Micropatterned platform towards high throughput mechanical characterisation of single adherent cell

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### Introduction and Aim

Cell-to-cell variability poses a major challenge in obtaining reliable data from in vitro experiments, especially in applications such as drug testing. Controlling the microenvironment and spatial organization of cells can help minimize this heterogeneity and improve reproducibility. In this project, we develop a high-throughput system to generate ECM-coated micropatterns on the coverslip, enabling uniform cell adhesion and growth. This approach allows more consistent measurement of cell mechanics, making it easier to assess treatment effects with reduced variability.



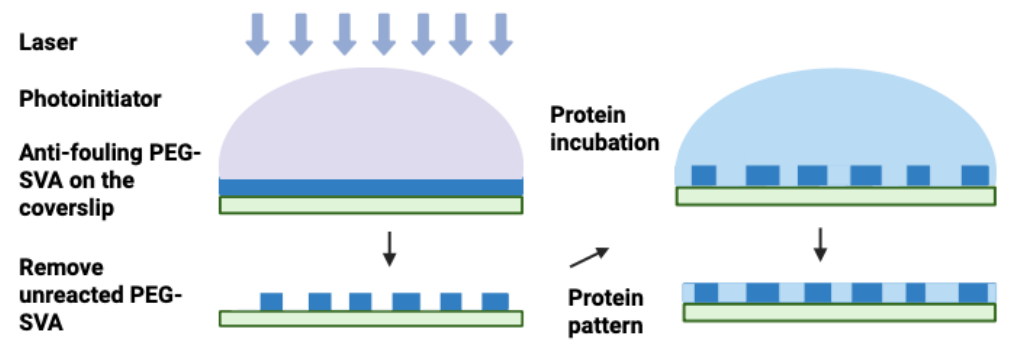
#### Aim:

Use photopatterning techniques to fabricate high-throughput protein patterns and compare the stiffness of adhered cells on the pattern and not on the pattern.

### Methods

#### Primo (Alvéole) photopatterning:

Primo projects UV patterns through a digital micromirror device (DMD) for micropatterning and hydrogel polymerization [1].

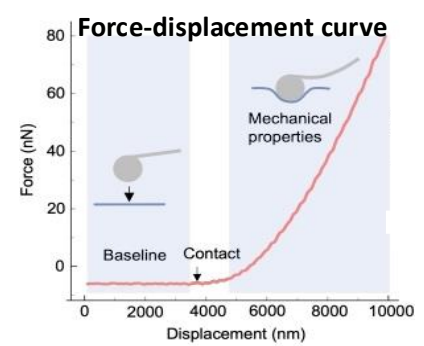


#### Cell Deformation Model:

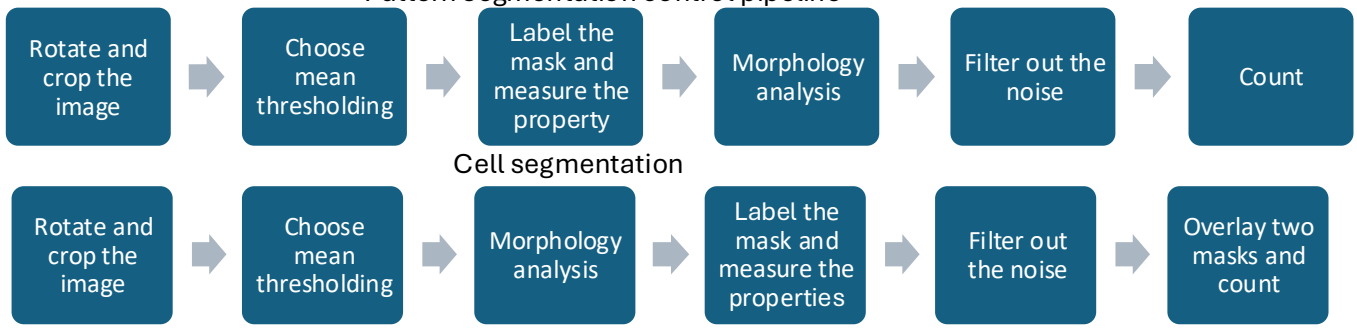
The deformation model is based on the paper from Torres et al., 2012 [2]. The spring network is used for modeling cellular deformation on triangular patterns.

#### Chiaro nanoindenter (Optics11 Life):

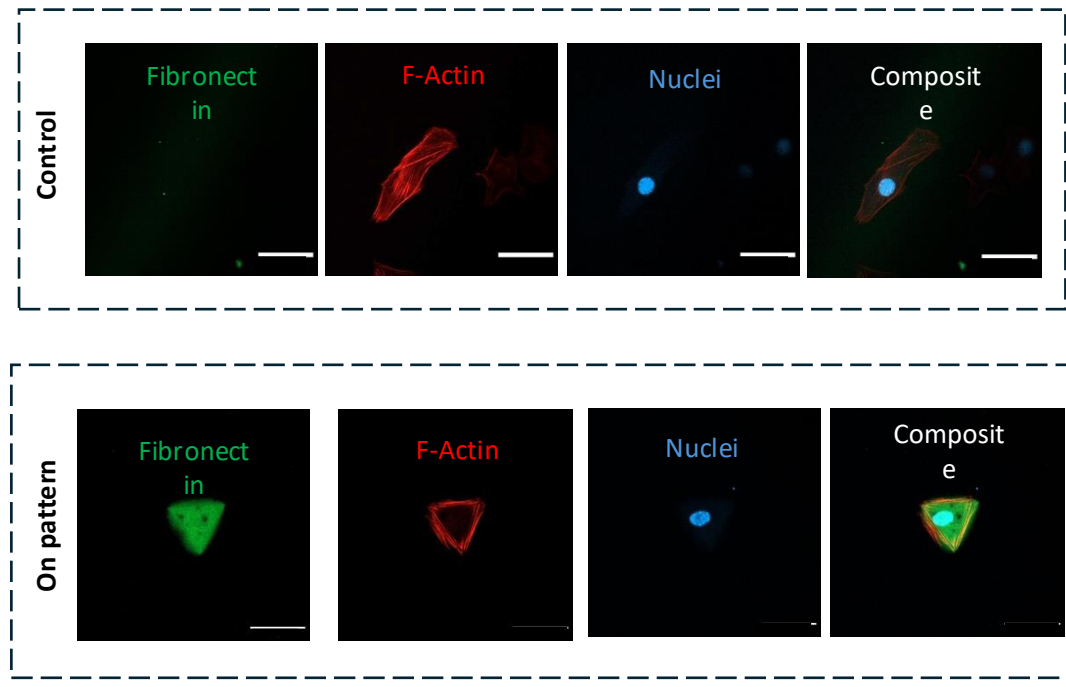
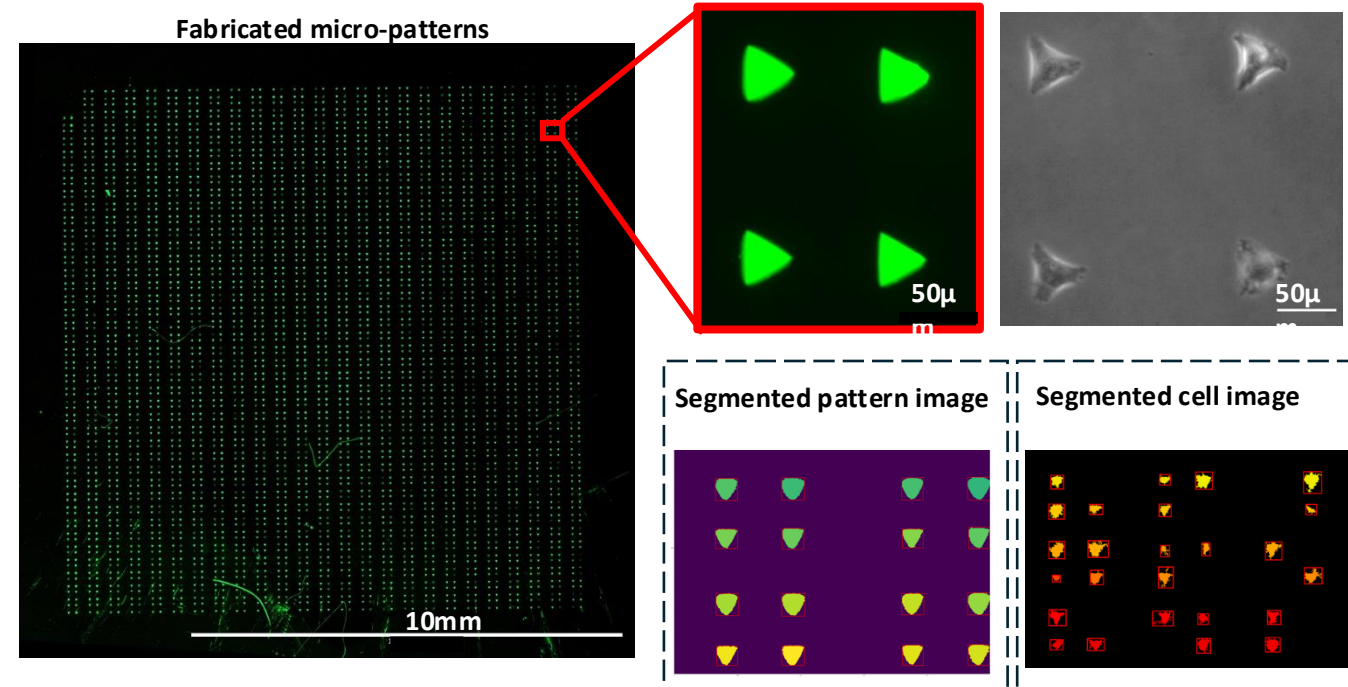
The contact point where the tip first touches the sample needs to be identified from the fitted curve. The Hertz model is utilised to extract the cellular stiffness [3].



#### Quantification:

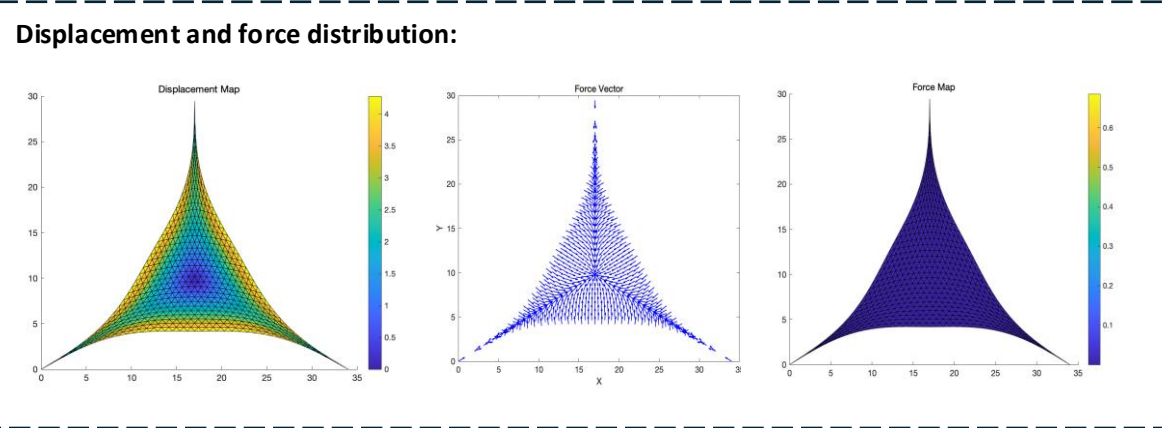
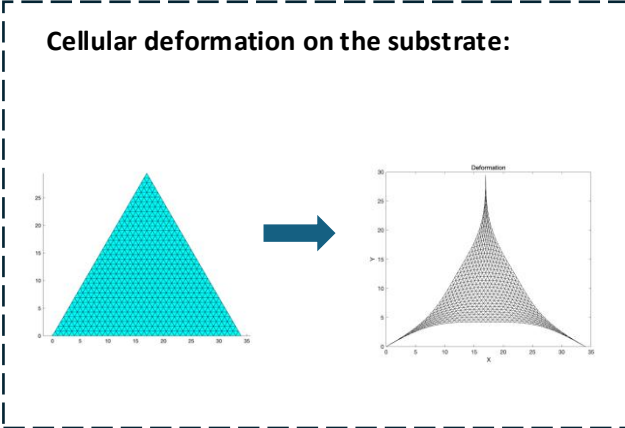
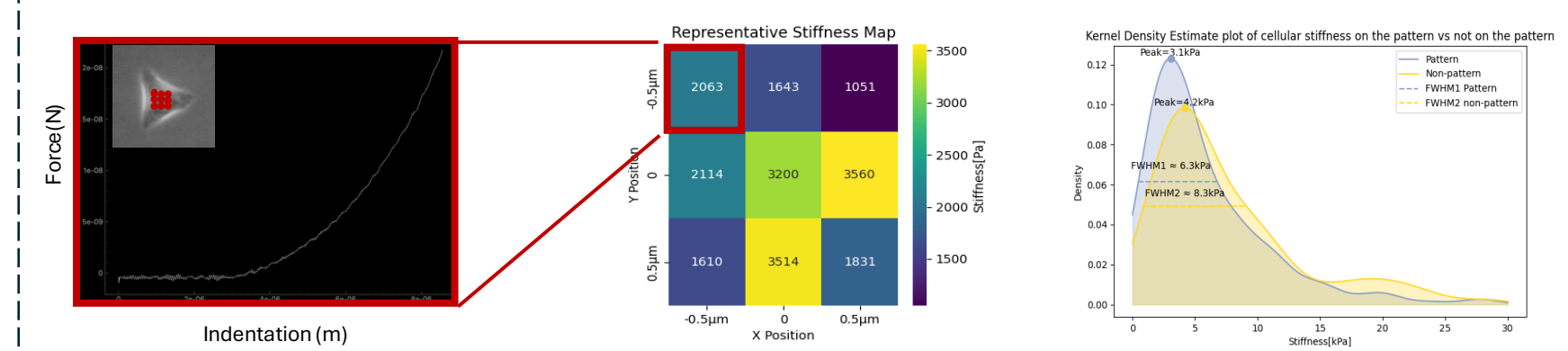


### Patterns and cellular adhesion

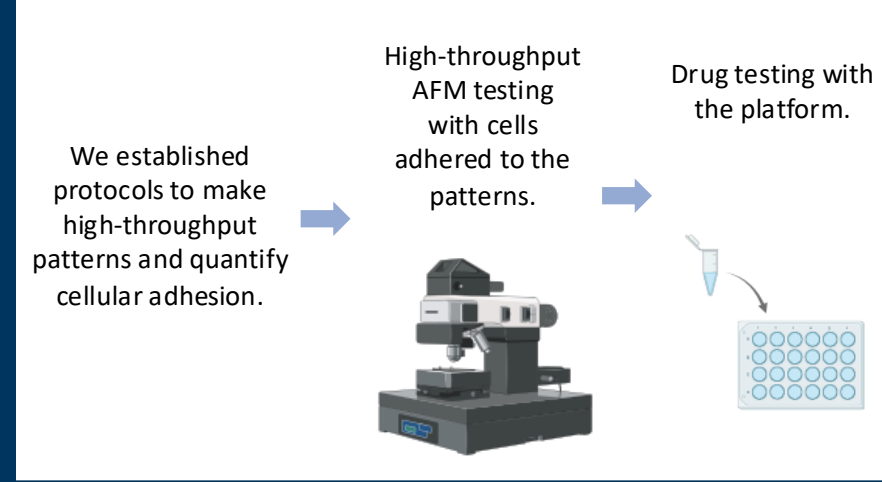


### Cellular stiffness and quantification

Measurements were performed using Chiaro (Optics11 Life) nanoindenter equipped with spherical tip of 3  $\mu$ m radius and 0.023N/m stiffness.



### Outlook



### References

1. Melero et al. *J Vis Exp.* 2019;152:60092.
2. Torres et al. *Phys Rev E.* 2012;85:011913.
3. Zambito et al. *Nanomaterials.* 2023;13(7):1190.



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