

## Cold Atmospheric-Pressure Plasma Treatment for Promotion of Cell Adhesion onto PDMS substrates

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This research aims to develop a cell coating on polydimethylsiloxane (PDMS) to study the response of corneal epithelial cells to mechanical stress. PDMS is a highly hydrophobic silicone elastomer, which despite its excellent mechanical properties is an unattractive surface for cell adhesion. In order to promote cell adhesion onto PDMS, a cold atmospheric-pressure plasma treatment has been used to modify the surface properties of the PDMS without affecting its bulk mechanical characteristics.

A helium plasma jet (3 standard litres per minute) with a small admixture of oxygen (0.5%) was used for the plasma treatments. The plasma was driven by an in-house built 25kV<sub>pp</sub> - 15kHz power supply and the power delivered to the plasma was limited to ~1W. The jet was scanned across the PDMS substrate and a programmable XY-translation stage was used to ensure even and repetitive treatment of PDMS samples. The jet described a grid pattern at 1mm intervals at a speed of 40mm/s. Two scans were performed per sample and the plasma treatment took around 40 seconds to be completed.

The Epithelial cells used in this study were Rabbit Corneal Epithelial (RCE) cells. The corneal epithelium is the outermost layer of the eye and it is exposed to the atmosphere, making it susceptible to damage by injury or during surgical procedures. It is known that cell migration plays a key role in the corneal wound healing process and in this study we aim at unravelling the influence of mechanical stress on cell's migratory behaviour by monitoring RCE cells attached onto PDMS substrates that are subjected to mechanical stress by means of a mechanical stimulation device.

Contact angle measurements and XPS analysis indicate changes on the surface of the PDMS after plasma treatment and the observed increased hydrophilicity also promotes RCE cell attachment (See fig 1).

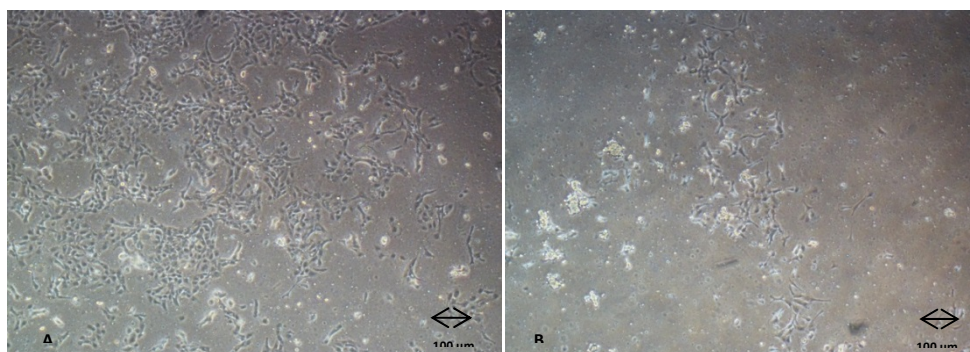


Figure 1- RCE cells on Plasma Treated (left) and Non-plasma treated (right) PDMS