

Advanced Materials Research Group project summary

Project Title	Effect of mechanical strain upon mammalian cells <i>in vitro</i>
Researcher	Matthew Moles Supervisors: Alastair Campbell Ritchie, Colin Scotchford
Project Summary	<p>Bioreactors can be used for mechanical conditioning and to investigate the mechanobiology of cells <i>in vitro</i>. An elastic polyurethane (PU) substrate has been modified, to support cell culture, for use in a uniaxial tensile strain type bioreactor (inset picture). PU membranes were plasma etched, across a range of operating parameters, in oxygen. Surface characterisation techniques, such as atomic force microscopy, contact angle goniometry, scanning electron microscopy and X-ray photoelectron spectroscopy, showed that surface properties were dependent on the etching power and etching duration.</p> <p>Volumetric displacement of the membrane by a microprocessor-controlled actuator imparts cyclic strain, of 1 to 3 % at up to 60 cycles per minute, to cells. Alignment, perpendicular to the principal force, was induced in MG-63 osteoblast-like cells within 3 days after 2 applications of strain (1 %, 30 cycles per minute, 1500 cycles).</p>

