MicroSquisher

Micro-Scale Compression System

The MicroSquisher is designed to perform compression testing on specimens between 50µm and 2mm with force resolutions as small as 50nN. Forces are determined from the deflection of a flexible cantilever beam to which one compression plate is attached. Displacement control is achieved by manipulating the base of that beam using a motorized piezo stage.

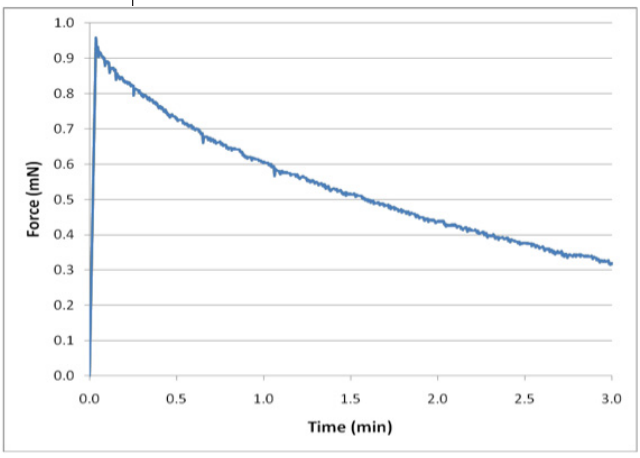
The specimen can be tested in ambient air or in a temperature-controlled fluid bath. An integrated camera system allows synchronized imaging at up to 5Hz.

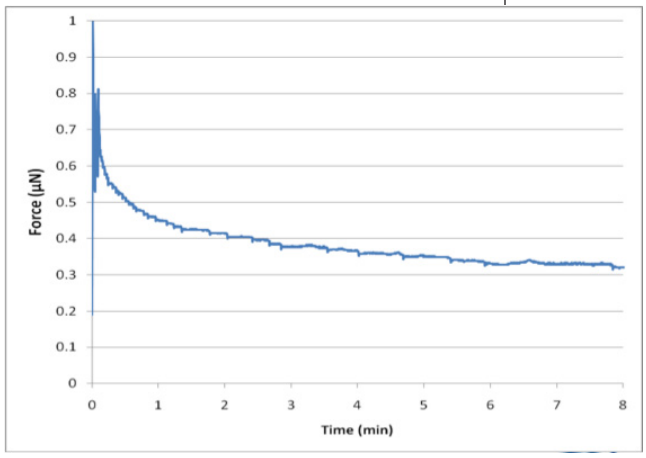
Micro-Scale Material Characterization

The MicroSquisher can be used to determine the compressive stress-strain properties of a variety of materials (hydrogel microspheres, small tissue samles, scaffolds and cell aggregates) with peak forces ranging from 1µN to 1mN.

The device can perform displacement-controlled compression and stress relaxation testing.

The graphs below demonstrate the range of force measurements that can be achieved using the device. Use different cantilever beam lengths and cross sections to change the force range.





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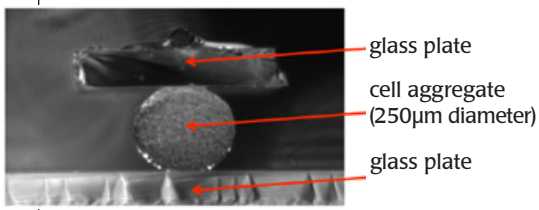
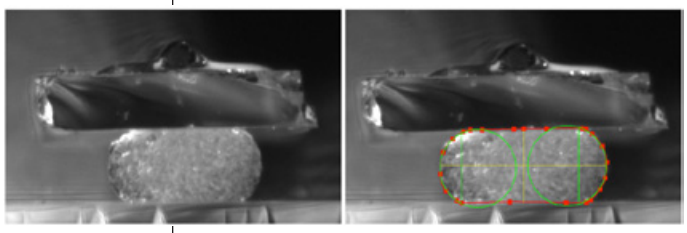
Cell Aggregate Compression

The interface tensions that exist play an important role in the organization of cells within aggregates. These properties can be determined by analyzing the force-time curve and test images from a parallel plate compression test.



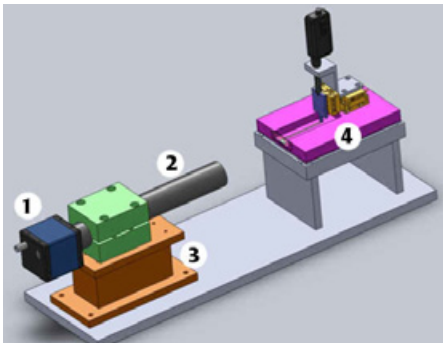
The MicroSquisher image analysis module quantifies the aggregate profile, allowing cell-cell and cell-medium interface tensions to be calculated.



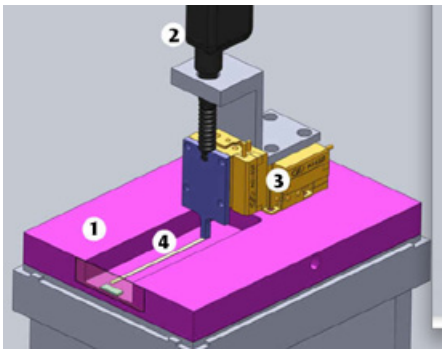
SPECIFICATIONS

Specimen Size 50µm–2mm
Force Resolution 50nN
Max. Compression Rate 30µm/s

System Overview



1. Camera (1280X960 pixel USB)
2. Zoom Lens System (0.3–4.2mm field of view)
3. Vertical Position Stage (manual imaging adjustment)
4. Test Chamber (details below)



1. Temperature controller fluid chamber
2. Vertical stage position feedback sensor (0.1µm resolution)
3. Axis piezo motor positioning system (0.05µm incremental motion)
4. Cantilever beam load applicator with attached upper compression plate

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