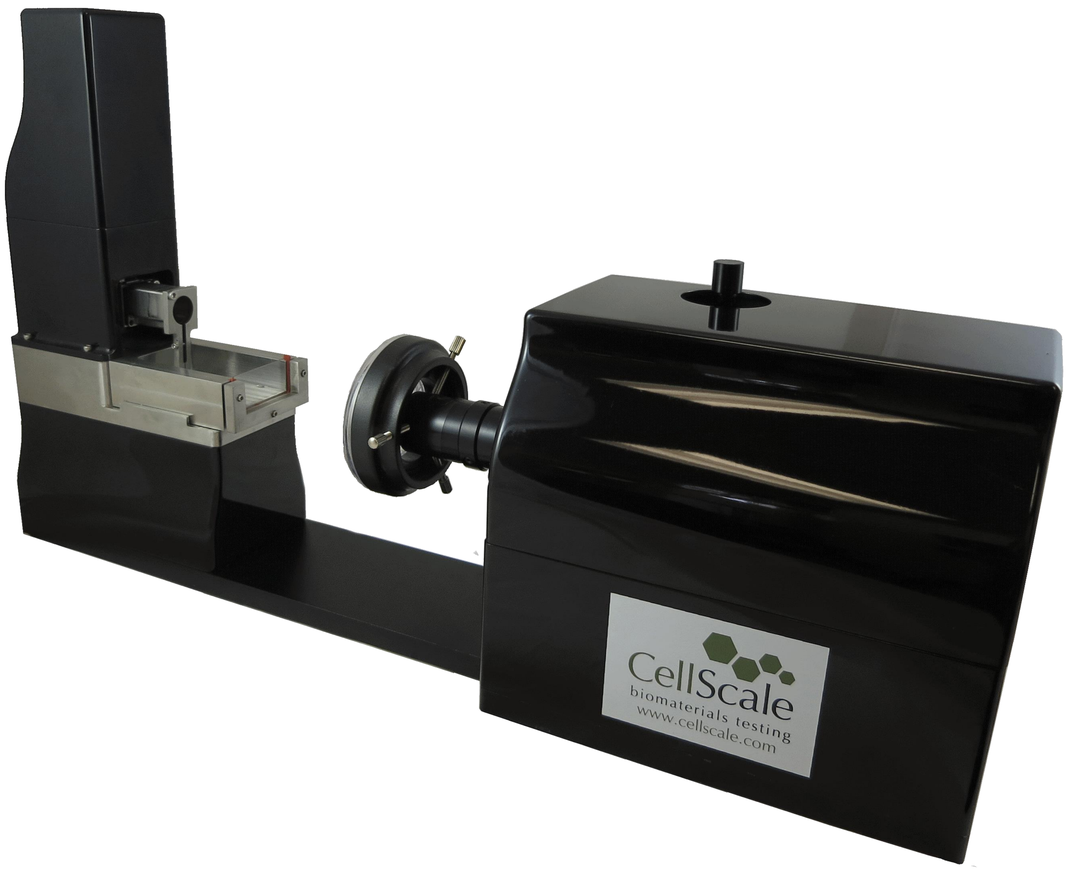
MicroScale Bend Testing

Overview

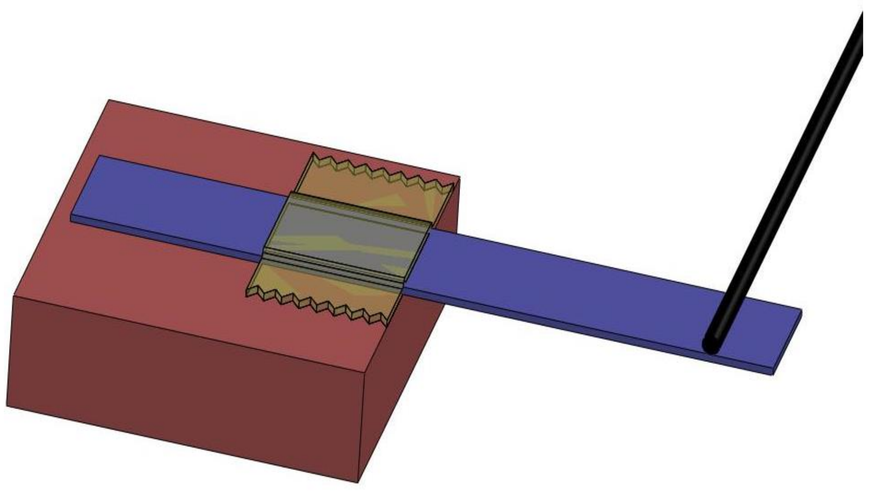
The MicroSquisher has been designed to perform tension and compression testing at low forces. Delicate films are often to thin to test in compression and too difficult to grip to test in tension. This is particularly true for materials with a relatively low elastic stain limit (<5%). For thin films, a bending test is often a good option.

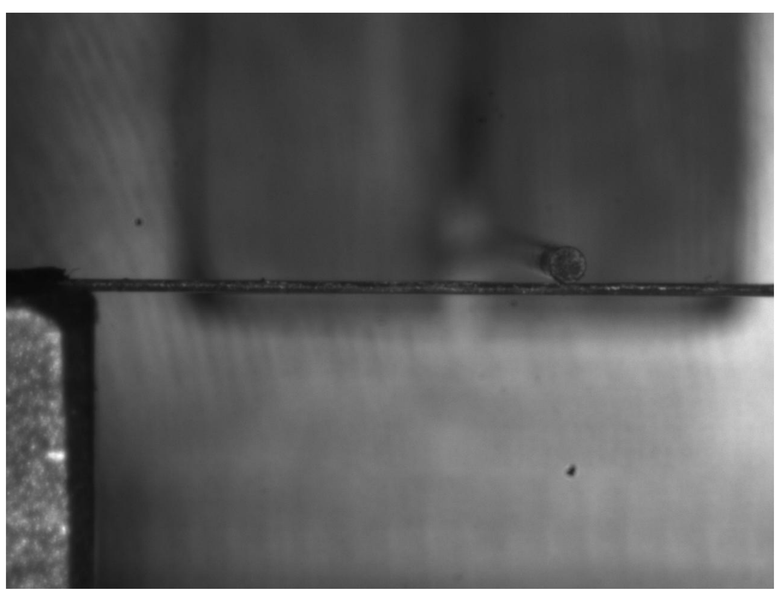
This report outlines the results of bending testing of a very thin film of hard material (aluminum foil, 0.02mm thick) and a thicker sheet made from a softer material (thermoplastic, 0.18mm thick).

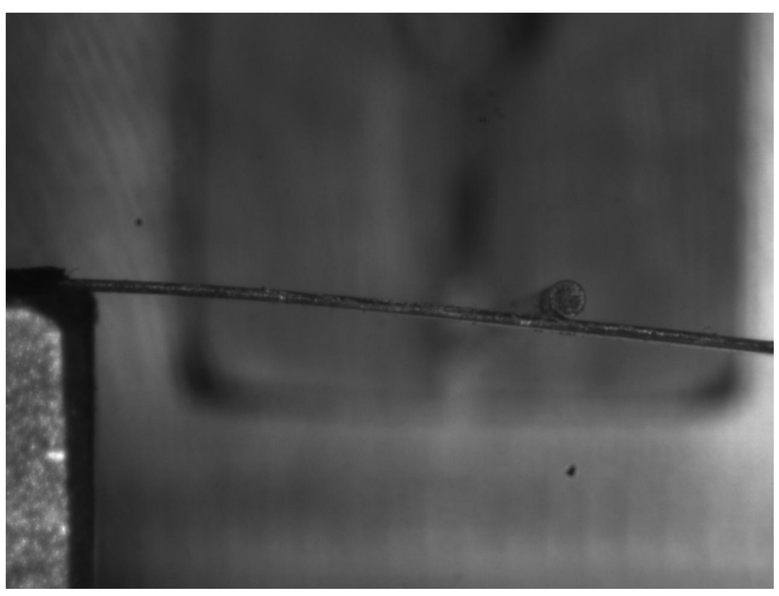


Thin Plastic Sheet Testing

The specimens for this test were cut from plastic microscope coverslips (Nunc Thermanox) with a thickness of 0.18mm. The coverslips were cut into strips 4mm wide and mounted with tap to a metal anchor block. The force probe was positioned 7mm from the edge of the block and protocol was specified that moved the probe at a constant velocity for 1.5mm.







The graph below shows the force vs. deflection for the 3 plastic sheet tests. The test data from the test can be used to calculate the slope of this curve. When combined with the specimen geometry, this slope can be used to calculate the specimen modulus with the modified cantilever bending formula shown below. For this material the 3 calculated modulus values were 4.78, 4.87, and 4.73MPa.

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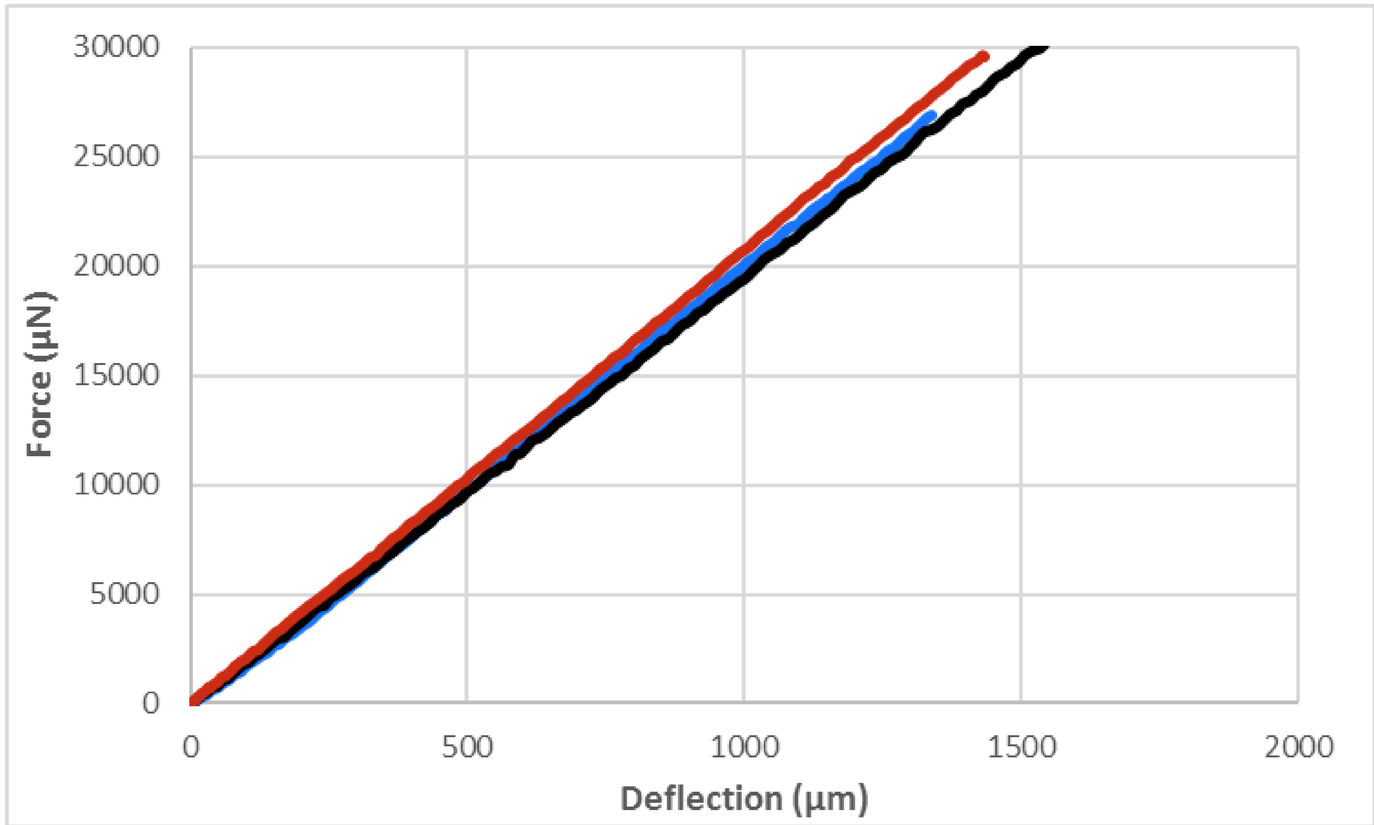
$$\delta = \frac{FL^3}{3EI} \qquad \frac{F}{\delta} = Slope$$

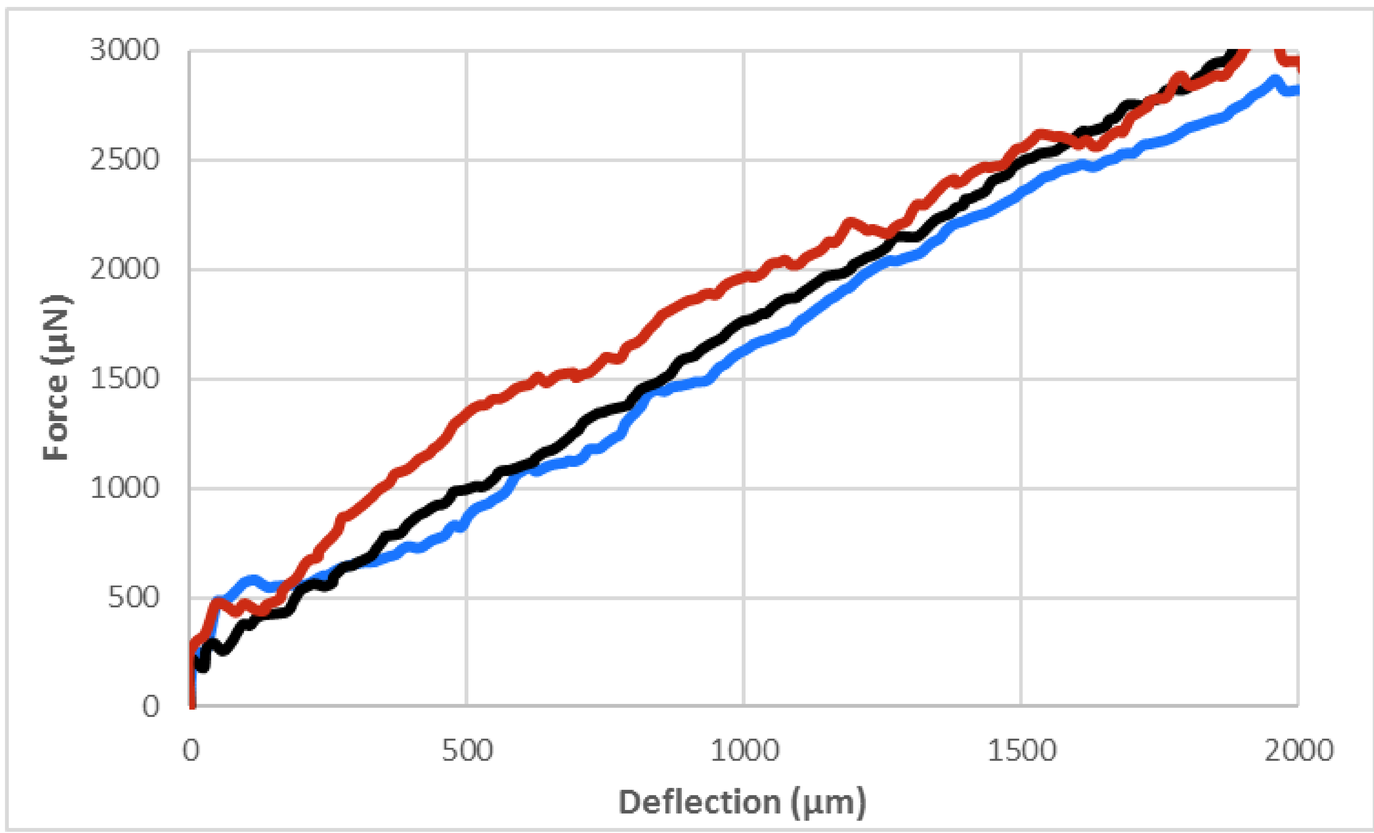
$$E = \frac{L^3}{3EI}\left(\frac{F}{\delta}\right)$$

F = applied force
L = specimen length (edge of block to force probe)
δ = deflection (probe displacement)
I = specimen 2nd area moment
E = specimen modulus



Aluminum Foil Testing

Strips of aluminum foil were tested in much the same manner as the plastic sheet. For this material the 3 calculated modulus values were 65.7, 71.7, and 69.5MPa.



Conclusions

This testing shows that the MicroSquisher is capable of measuring the stiffness of thin membranes using a bending test technique.

CellScale biomaterials testing

CellScale Biomaterials Testing is the industry leader for precision biomaterial and mechanobiology test systems. Our products are being used at world-class academic and commercial organizations in over 30 countries around the globe.

Our mechanical test systems allow researchers to characterize the mechanical properties of biomaterials. Our mechanobiology technologies provide insights into the response of cells to mechanical stimulation.

CellScale's technologies are improving human health by helping researchers discover the causes of disease, improve medical treatments and devices, and advance regenerative medicine and other basic science research.

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