

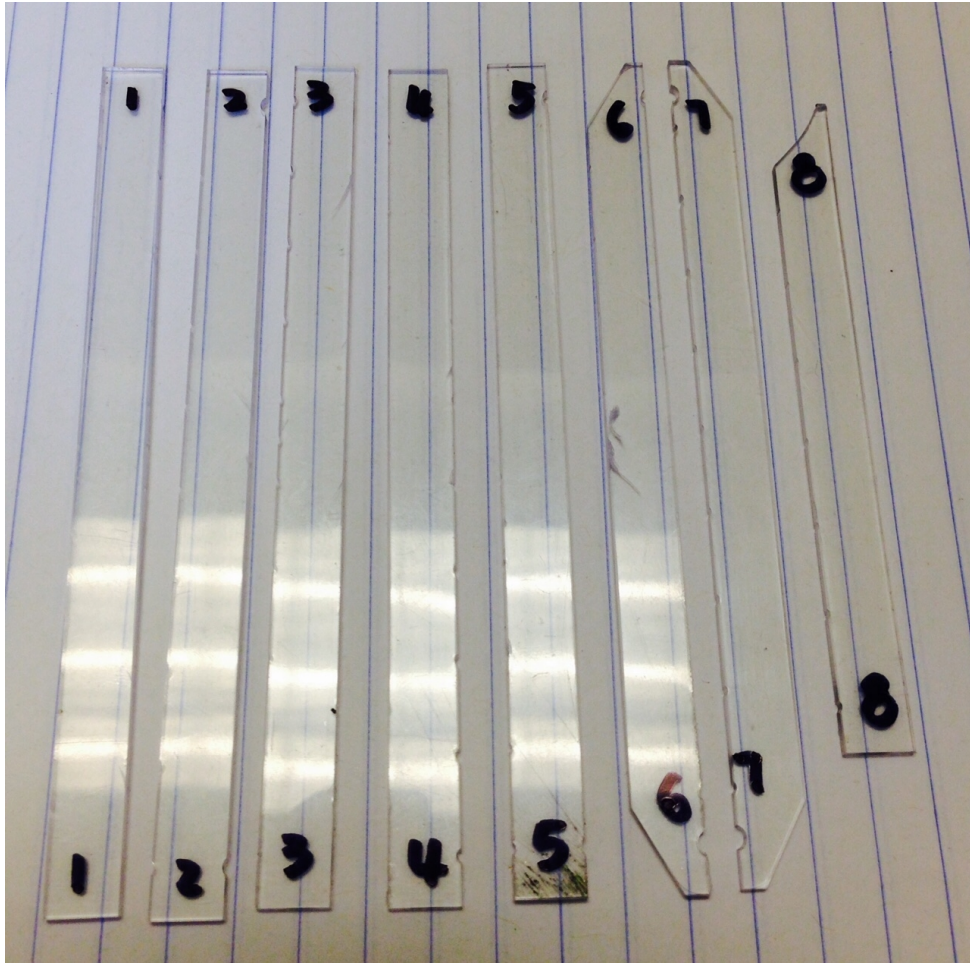
Modulus Measurement of Kedi Scintillators

Xiaochao Zheng

UVa

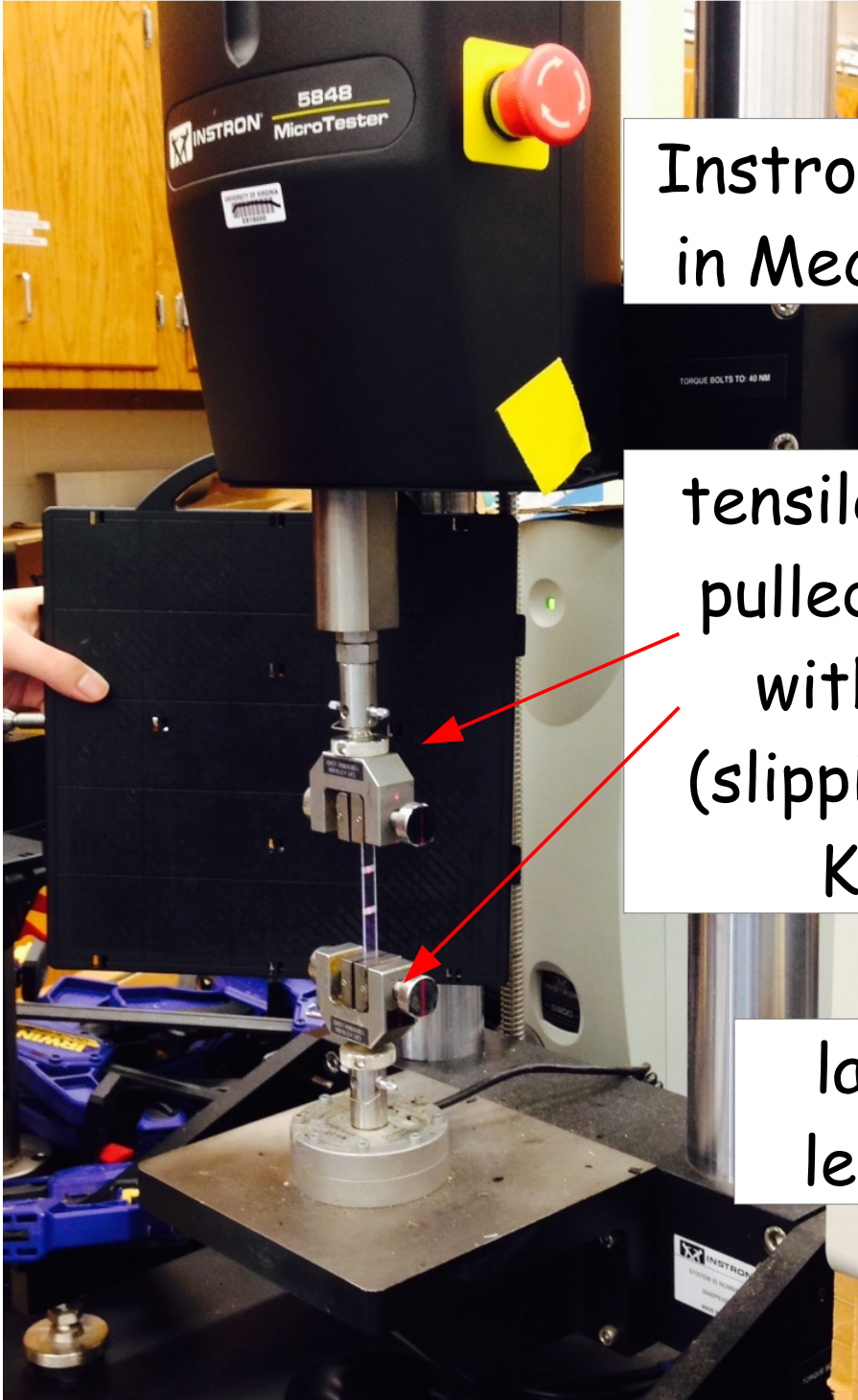
2016/2/4

Sample Preparation



Cut one shashlyk piece to make 8 samples, cross-section (1.52 ± 0.02) by (8.06 ± 0.03) mm

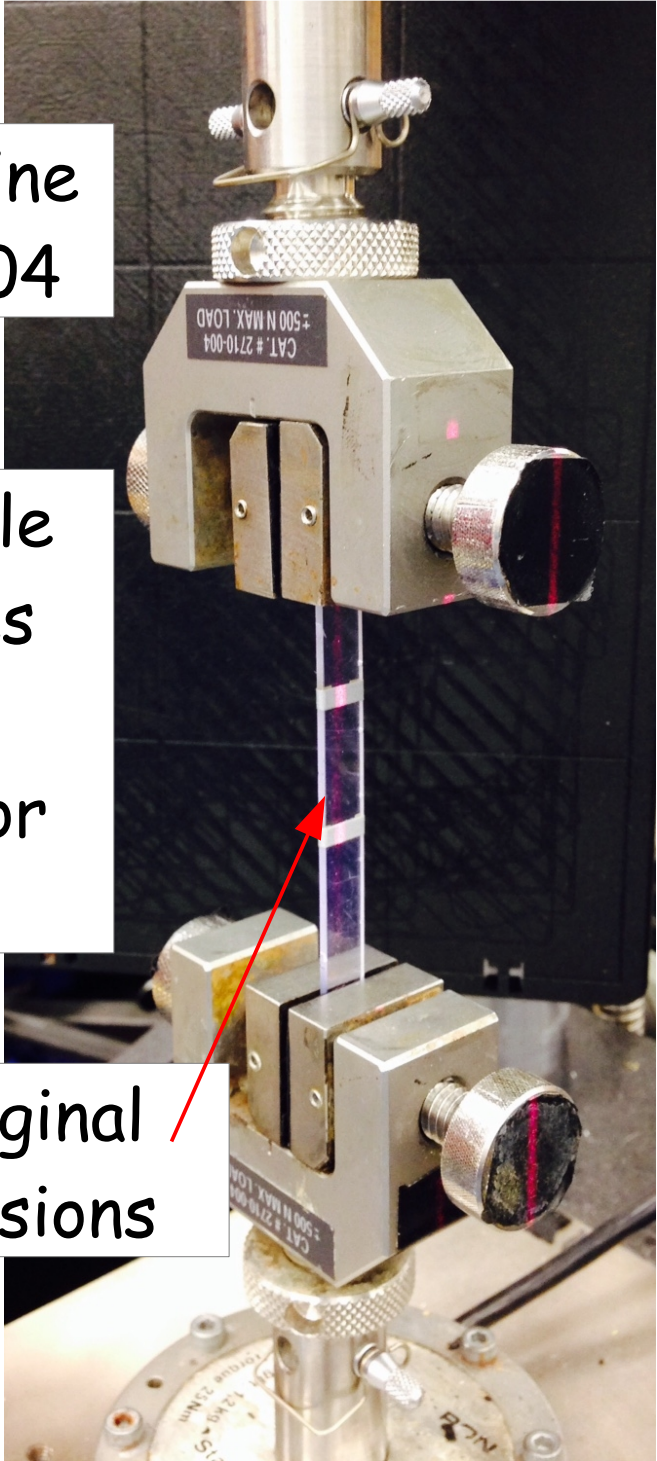
Tensile Testing Setup



Instron testing machine
in Mech. Eng. room 104

The image shows a black Instron 5848 MicroTester machine. A red emergency stop button is visible on the upper right. A yellow tag is attached to the machine. A person's hand is partially visible on the left side, near a black panel. The machine is mounted on a base with a silver-colored lower section.

tensile testing: sample
pulled by two handles
with force sensor
(slipping happened for
Kedi samples)

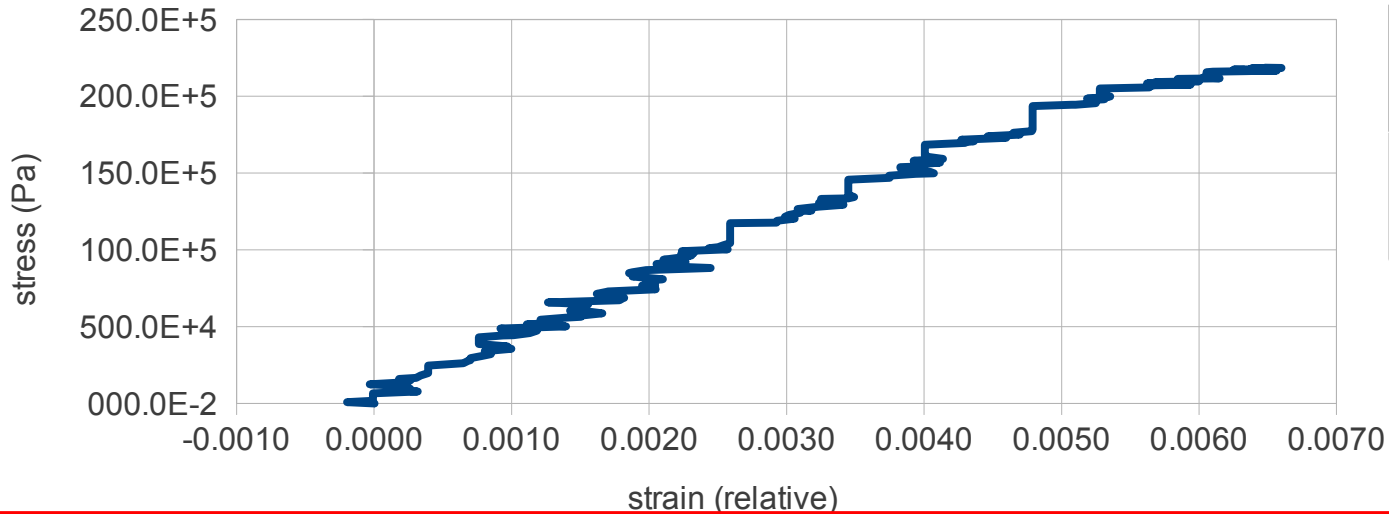


A close-up view of the tensile testing setup. A thin, purple-colored sample is held between two metal grips. A red laser line is visible on the sample. The grips are labeled 'CAT. # 2710-004' and '500 N MAX. LOAD'. A red arrow points from the text box to the laser line on the sample.

laser reading original
length and extensions

Shashlyk Stripe Sample Tensile Test Results (did not reach failure due to slipping)

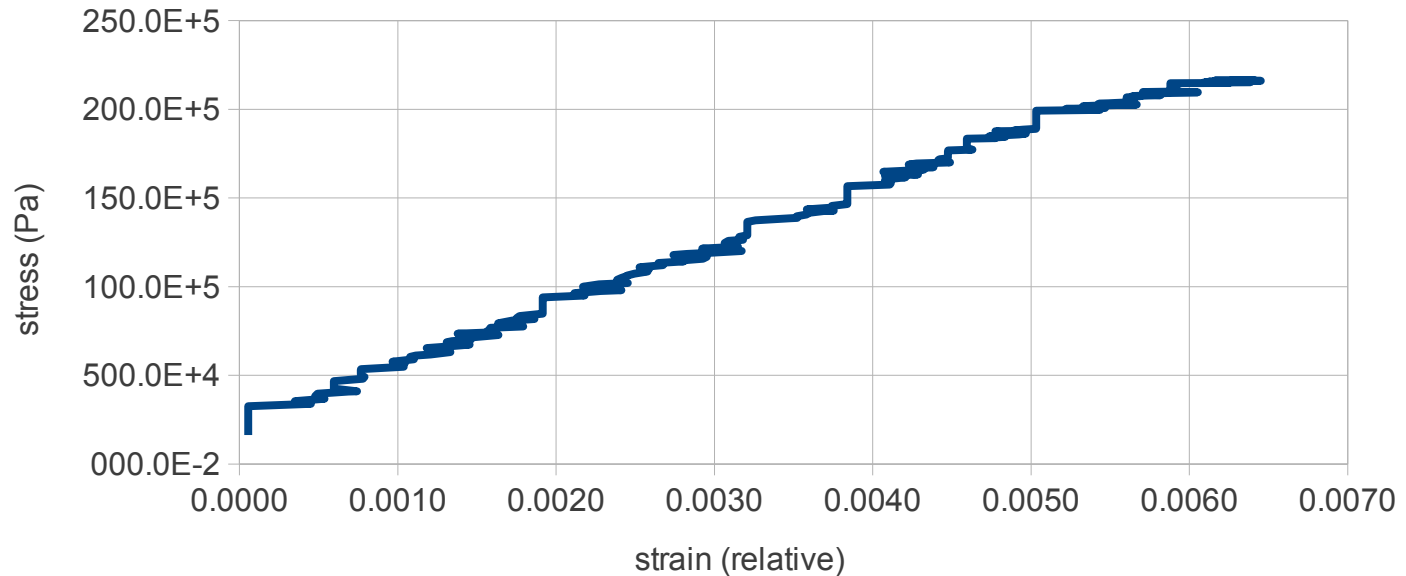
Young's Modulus Measurement
Kedi Shashlyk Stripe Sample #1, Test #2
2/3/2016



Young's modulus (MPa)	3230.91
tensile strength (MPa)	>22

Young's modulus (MPa)	3031.50
tensile strength (MPa)	>20

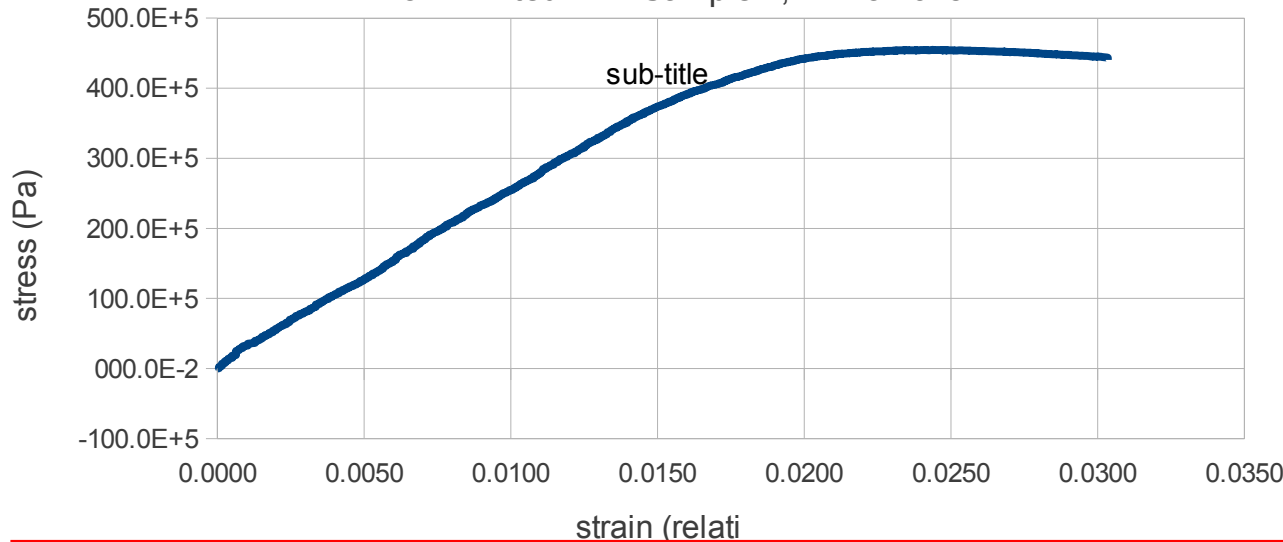
Young's Modulus Measurement
Kedi Shashlyk Stripe Sample #2, Test #2
2/3/2016



Web data (metweb.com)
for polysterene: tensile
modulus 3GPa; ultimate
tensile strength 40MPa.

Control Measurement using 3D-Printed PLA (failure reached)

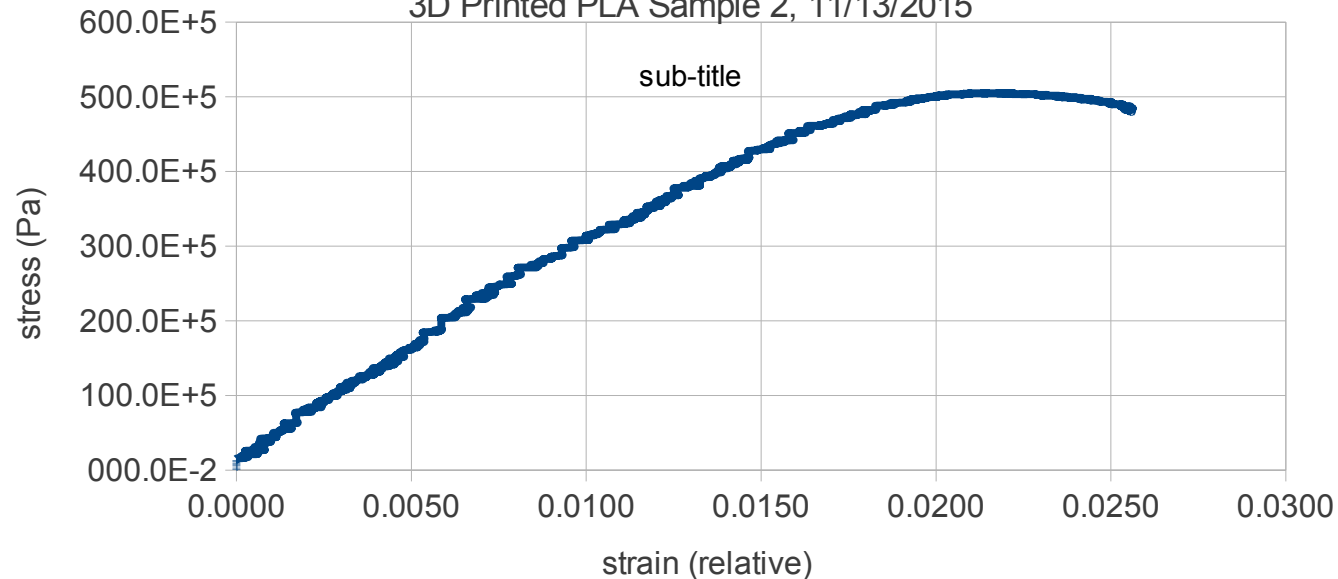
Young's Modulus Measurement
3D Printed PLA Sample 1, 11/13/2015



Young's modulus (MPa)	2493.12
tensile strength (MPa)	44.06
strain at tensile strength	0.030

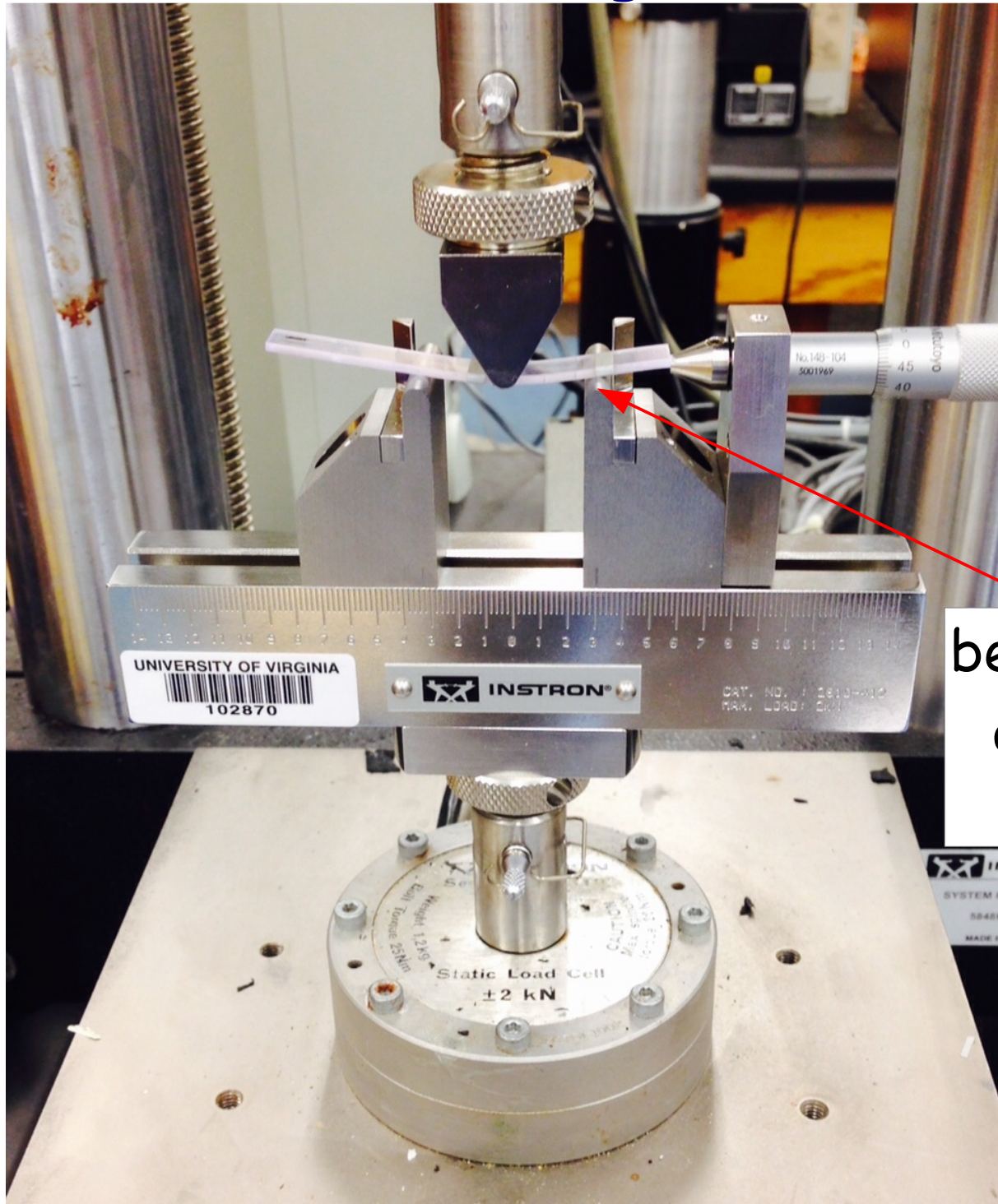
Young's modulus (MPa)	2833.69
tensile strength (MPa)	47.77
strain at tensile strength	0.026

Young's Modulus Measurement
3D Printed PLA Sample 2, 11/13/2015



Published data: tensile modulus (3.2-3.5)GPa; ultimate tensile strength (48-60)MPa. - B.M.Tymrak et al. Materials and Design 58 (2014) 242-246

3-Point Bending (Flexural) Testing Setup



bending (shear) test: load applied to mid point of sample until breaking

Web Data for Polystyrene (matweb.com)

- tensile modulus 3 GPa; tensile ultimate strength 40MPa
- flexural modulus 2.5 GPa; flexural strength 70MPa
- compressive modulus 2.5 GPa; compressive yield strength 70MPa