

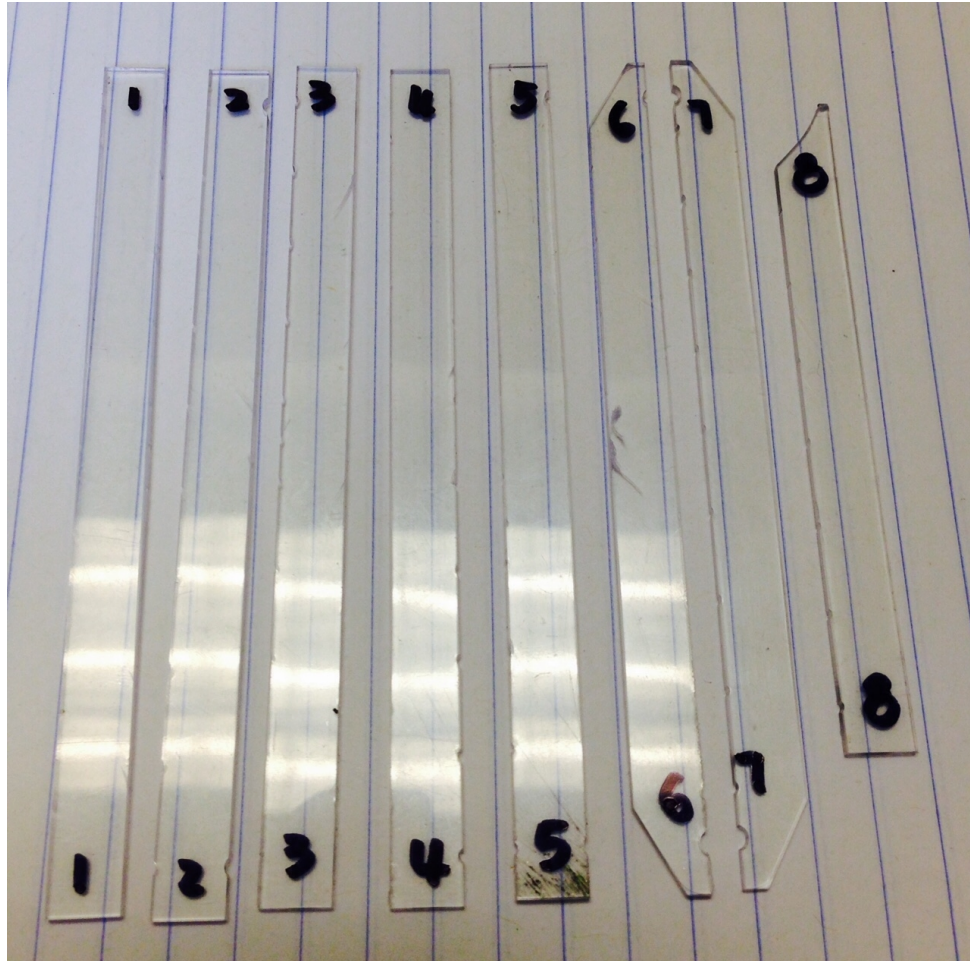
# Modulus Measurement of Kedi Scintillators

Xiaochao Zheng

UVa

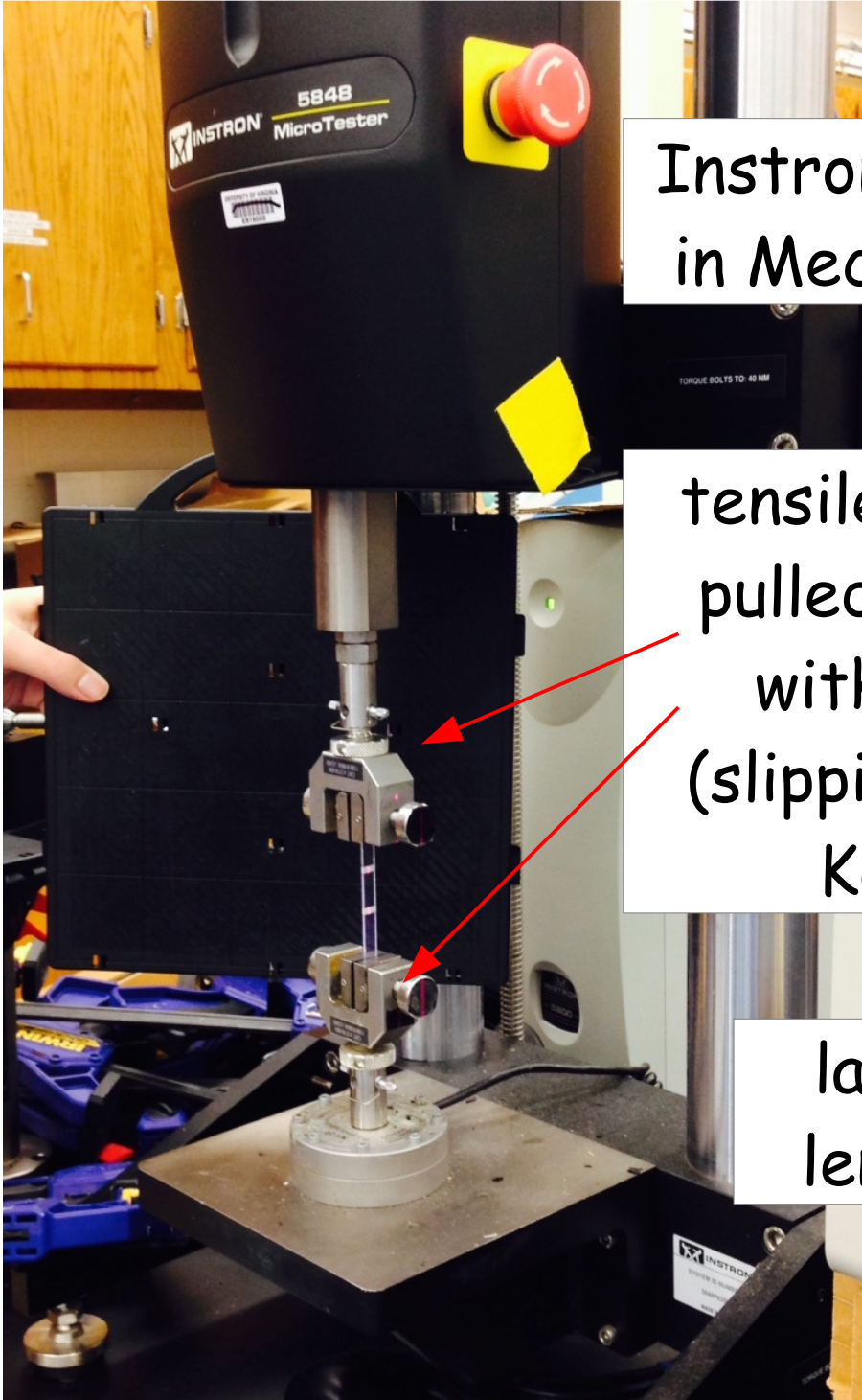
2016/2/4

# Sample Preparation

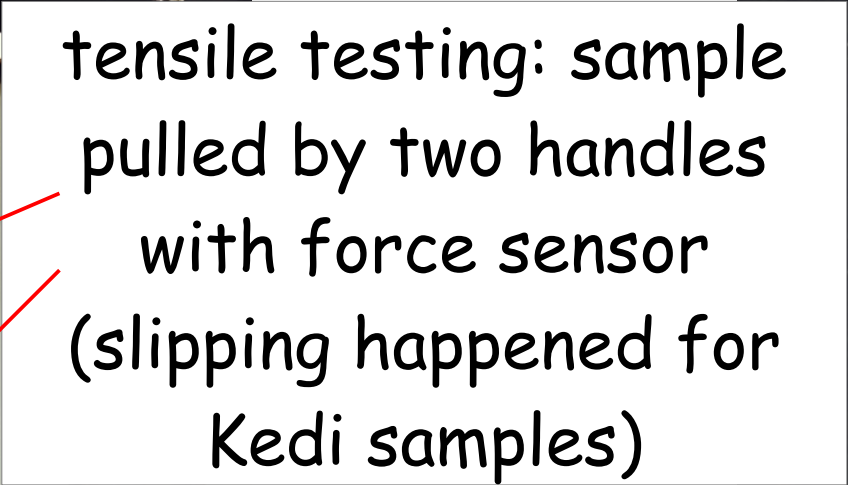


Cut one shashlyk piece to  
make 8 samples, cross-section  
 $(1.52 \pm 0.02)$  by  $(8.06 \pm 0.03)$ mm

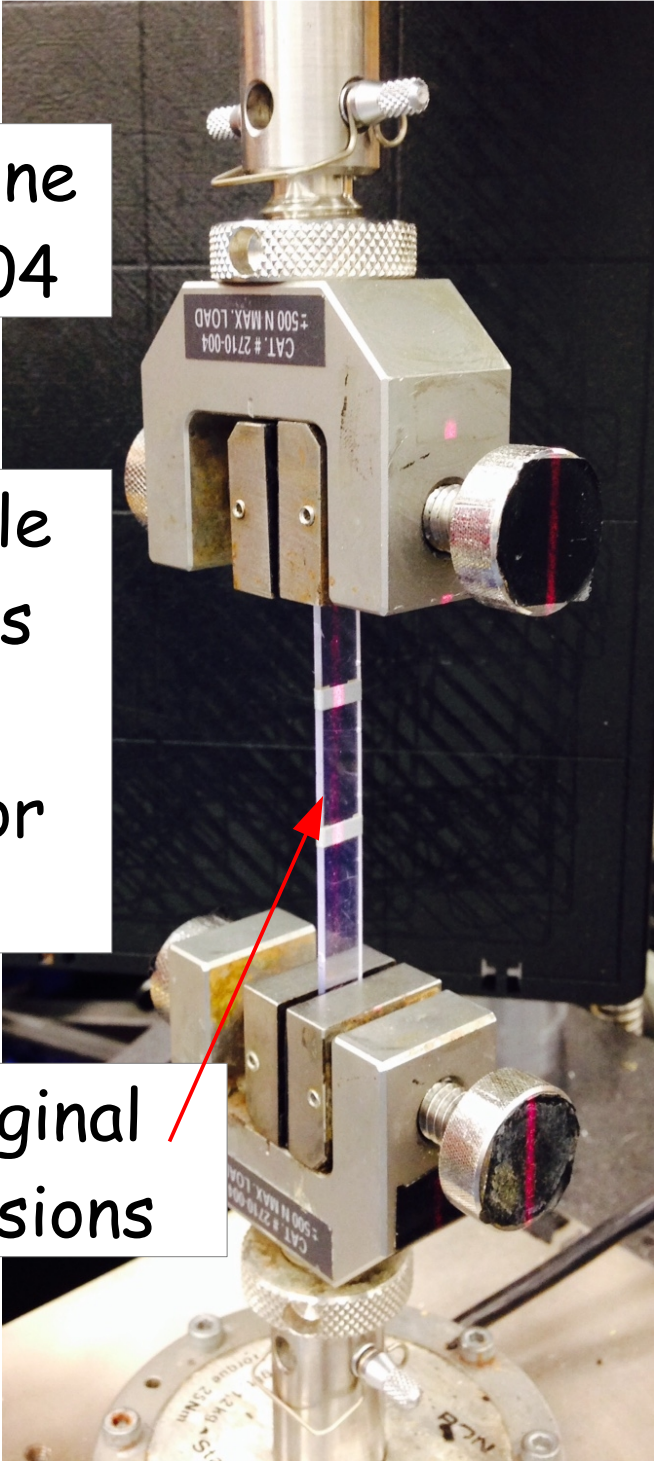
# Tensile Testing Setup



Instron testing machine  
in Mech. Eng. room 104



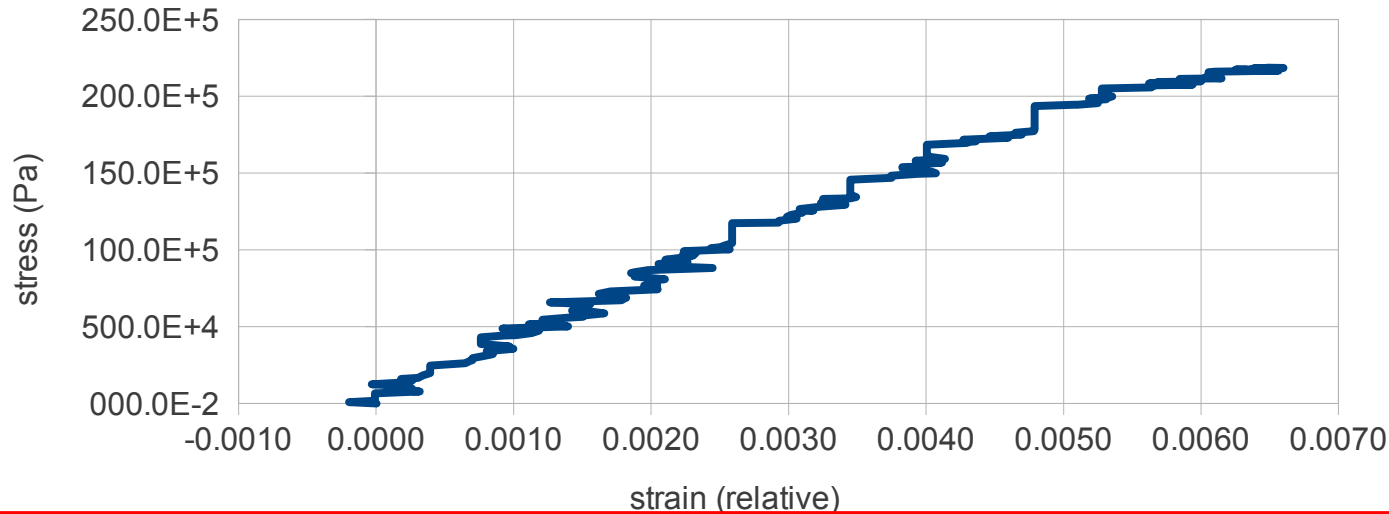
tensile testing: sample  
pulled by two handles  
with force sensor  
(slipping happened for  
Kedi samples)



laser reading original  
length and extensions

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

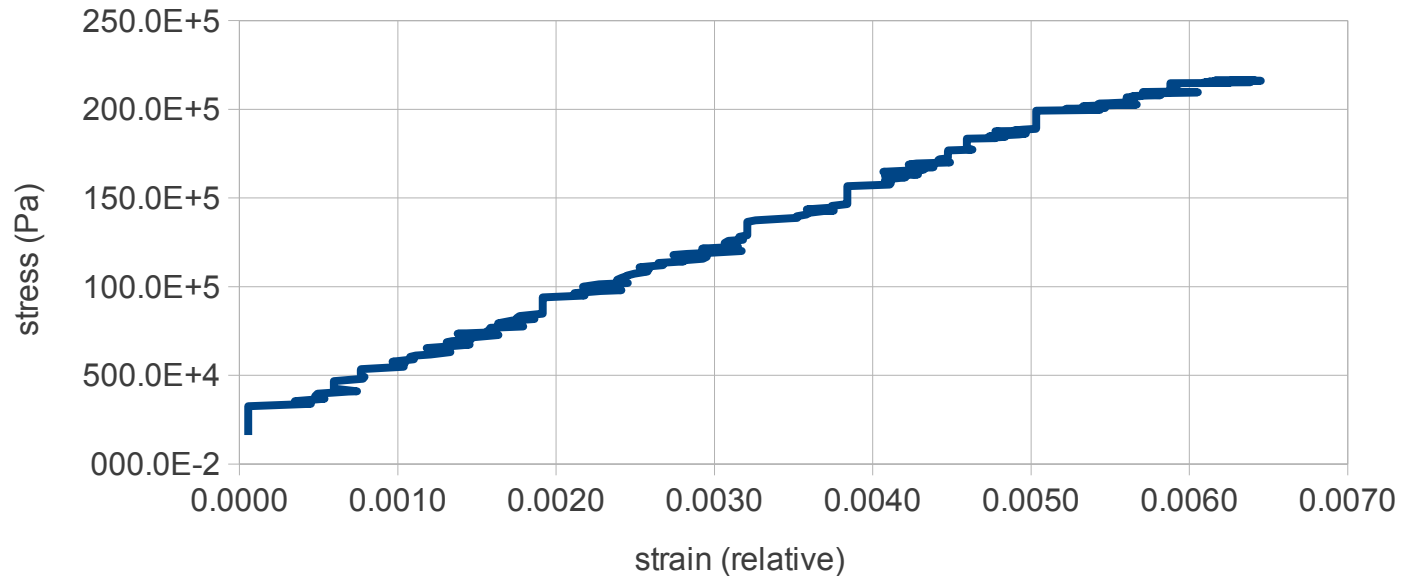
Young's Modulus Measurement  
Kedi Shashlyk Stripe Sample #1, Test #2  
2/3/2016



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

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

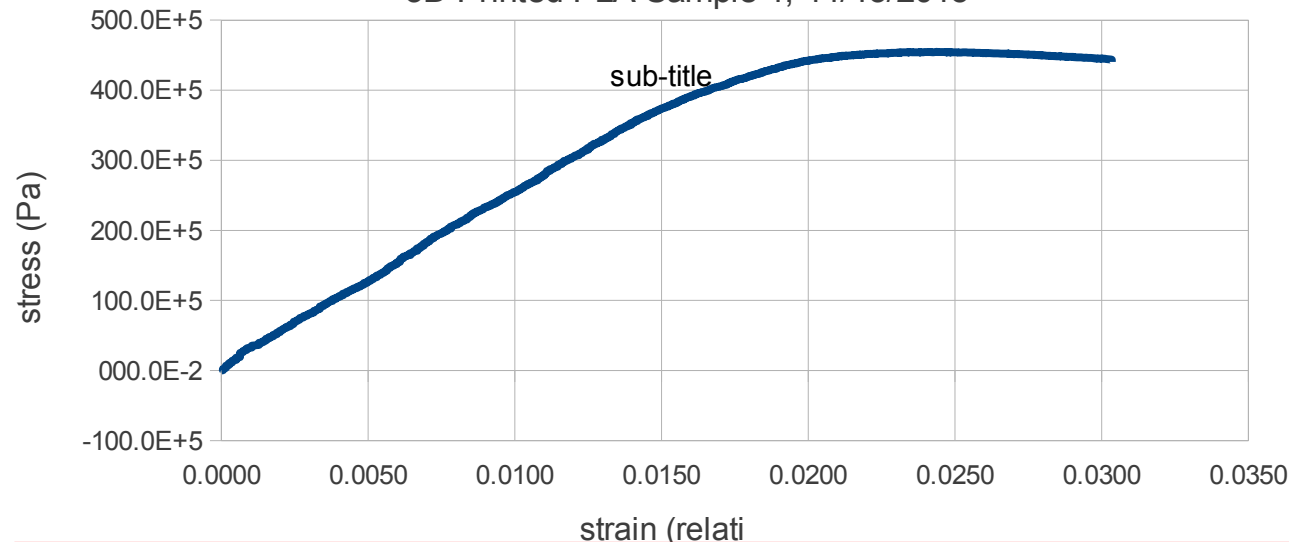
Young's Modulus Measurement  
Kedi Shashlyk Stripe Sample #2, Test #2  
2/3/2016



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

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

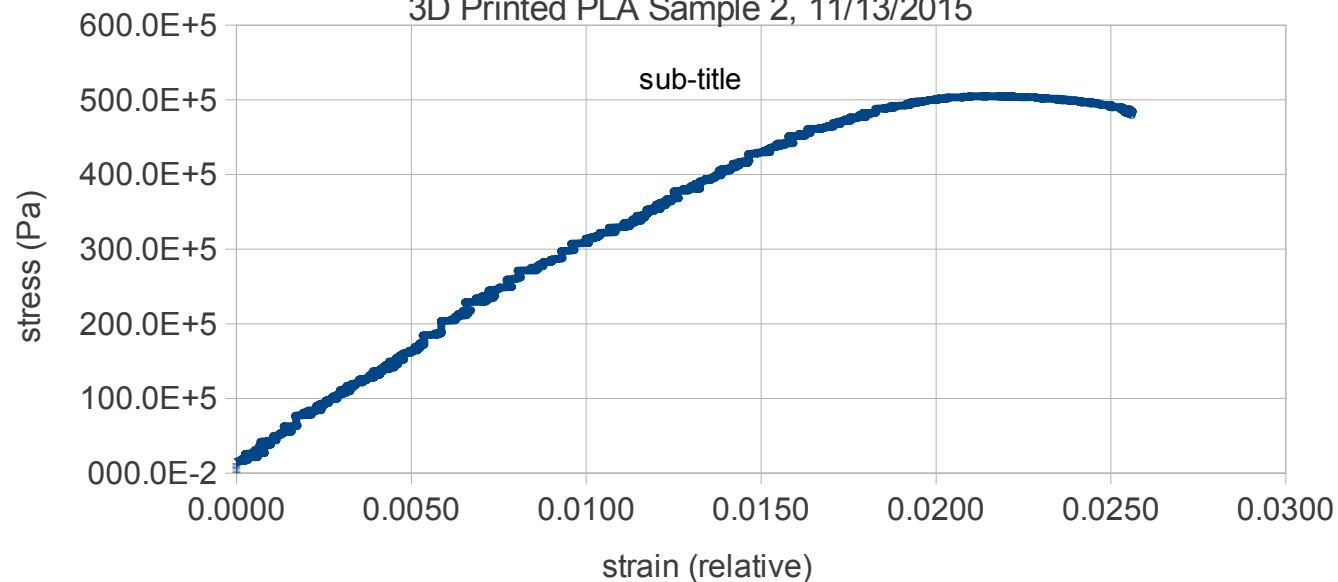
Young's Modulus Measurement  
3D Printed PLA Sample 1, 11/13/2015



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

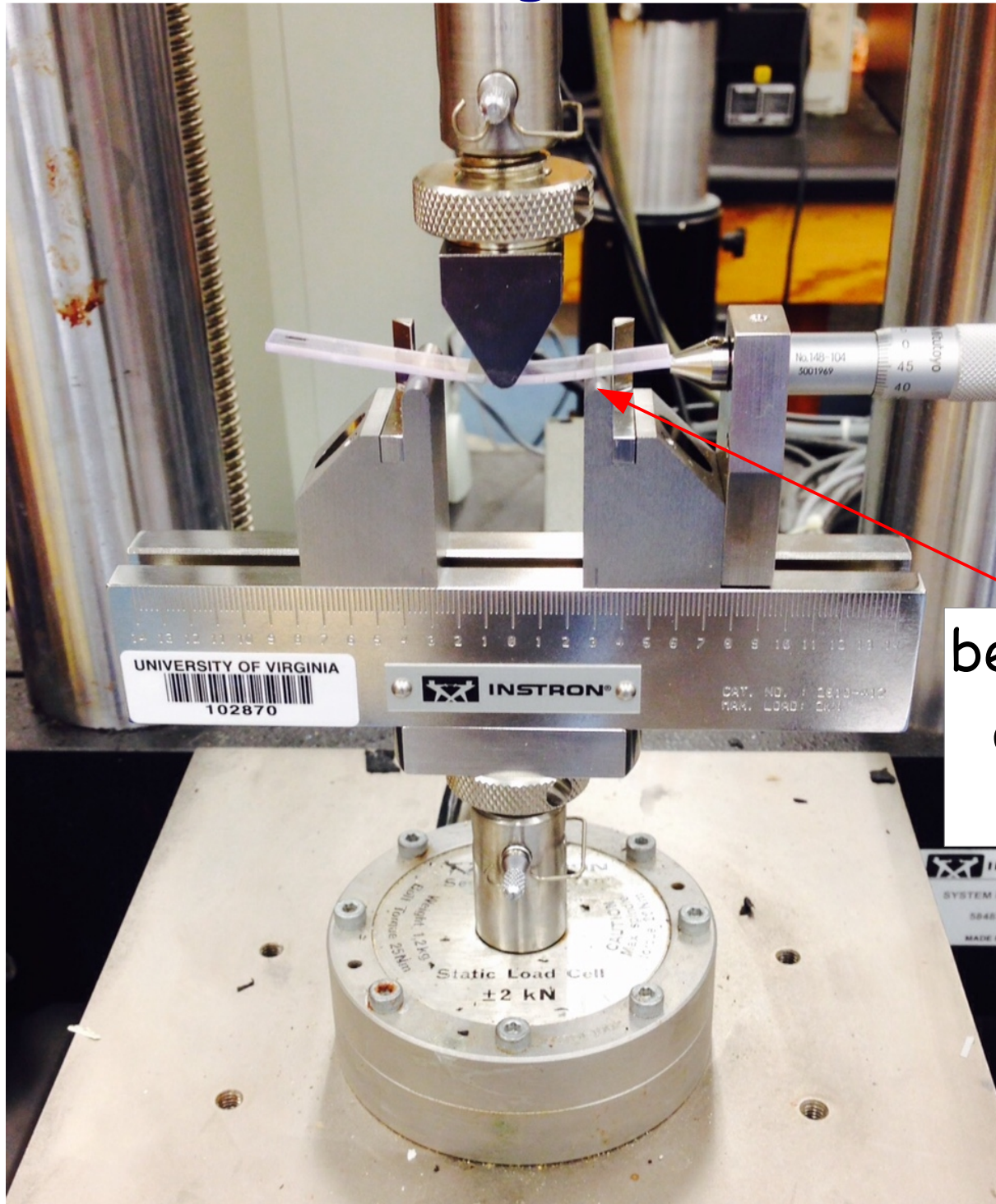
|                            |         |
|----------------------------|---------|
| Young's modulus (MPa)      | 2833.69 |
| tensile strength (MPa)     | 47.77   |
| strain at tensile strength | 0.026   |

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

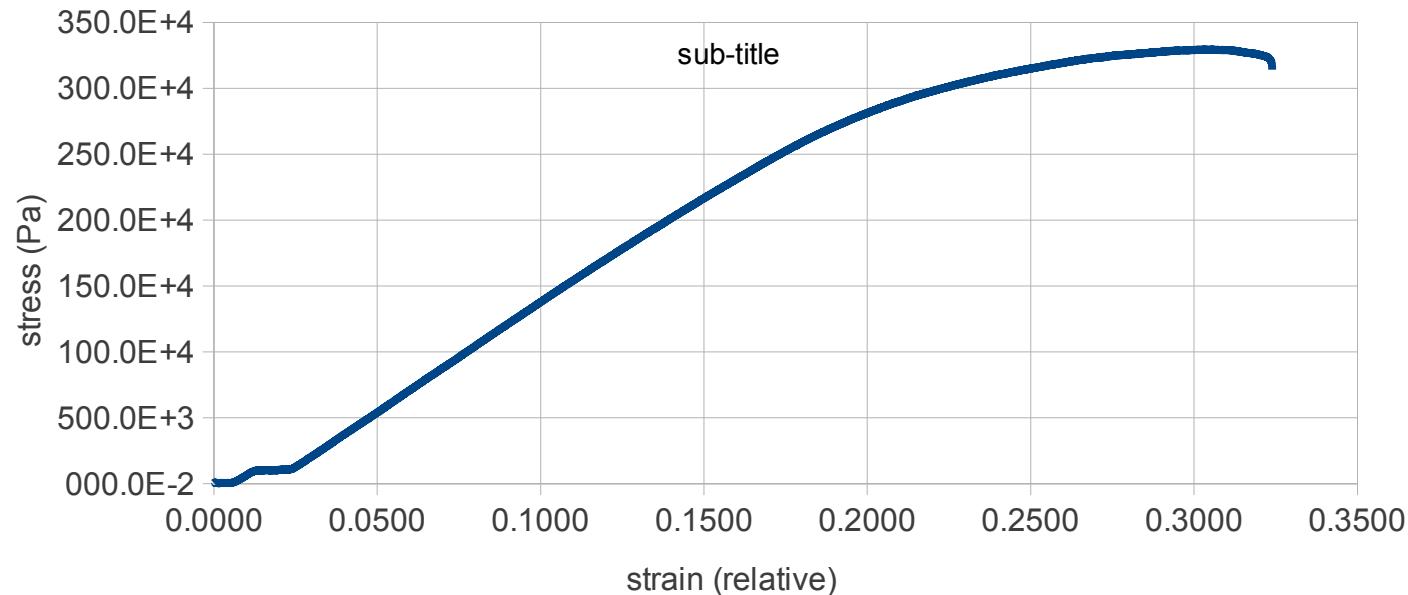
# Bending (Shear) Testing Setup



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

# Shashlyk Stripe Sample Tensile Test Results (failure reached)

Bending/Shear Modulus Measurement  
Kedi Shashlyk Stripe Sample #1, Test #3 (to failure)  
2/3/2016



|                          |       |
|--------------------------|-------|
| Shear modulus (MPa)      | 16.26 |
| Shear strength (MPa)     | 3.141 |
| strain at shear strength | 0.324 |

Web data (metweb.com) for  
polysterene (molded, un-  
reinforced): shear modulus  
0.75-1.45 GPa