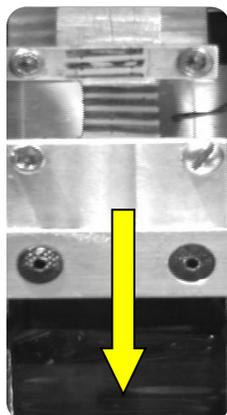
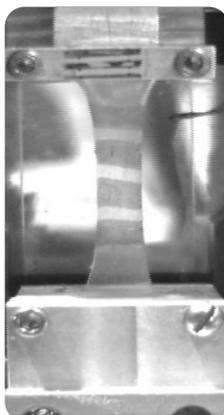


# Beamline 1-4 Sample Environments: Tensile Tester



$\lambda = 0\%$



$\lambda = 300\%$

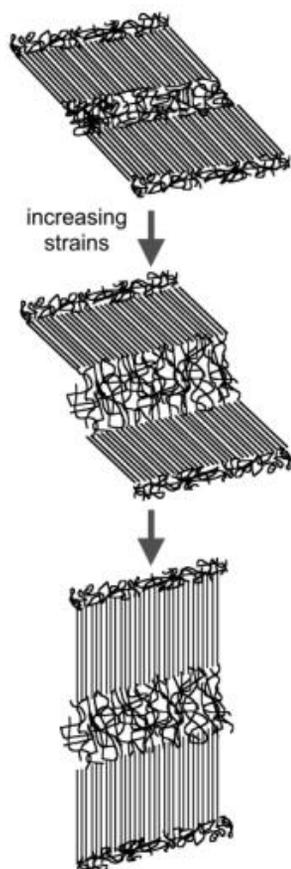
**Device:** Tensile Tester

**Use:** In-situ transmission SAXS studies of polymer networks under dynamic strain

**Capacity:** Extension rate E:  
 $0.001 \text{ mm s}^{-1} < E < 25 \text{ mm s}^{-1}$ ;  
Strain capability  $\lambda$ :  $0\% < \lambda < 300\%$   
Oven Temp T:  $25^\circ\text{C} < T < 100^\circ\text{C} \pm 2^\circ\text{C}$

## Showcase Project: Stereoblock Elastomeric Polypropylene in Dynamic Strain

*W. Wiyatno, J. A. Pople, A.P. Gast, R.M. Waymouth, G.G. Fuller*



Unstretched elastomeric polypropylene (ePP) reveals a crystalline phase of the R -form isotactic polypropylene (i-PP). (Right top)

Under tensile stretching, high-tacticity fractions contribute to the equatorial and off-axis diagonal scatterings, revealing molecular-scale orientation parallel to the strain axis and crystalline phase transformation from the R -form to the mesomorphic form. (Right centre) The meridional arc is contributed by the low-tacticity ether-soluble fraction with crystalline chains oriented orthogonally to the strain direction. (Right bottom)

At low strains, most of the strain is accommodated by the inter-lamellar amorphous chains aligning with the strain axis (left), while lamellar ribbons slip rigidly. At higher strain deformation occurs by the slip-tilting of the crystalline lamellae and the crystalline phase changes. At highest strain the lamellae are ruptured by blocks of crystals pulled out of the ribbons.

