

ESR 9 – Simone Sbrescia

Enrolled at the UCLouvain - Supervisor: Evelyne Van Ruymbeke

Working at DSM Material Science Center, Geleen - The Netherlands - From

May 1st on *“Influence of Temperature and Composition on Mechanical
Properties of DD-TPEs”*

Planned secondment in UCLouvain for statistical modelling

Background

Graduated in Materials Engineering at
the University of Naples Federico II
2015-2017

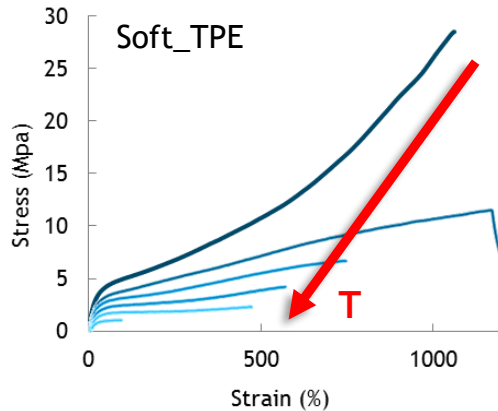
Internship at the Italian Institute of
Technology, Naples - 2017

*“A novel platform for 3D Tissue culture: full
differentiation in microfluidic device and
continuous monitoring of barrier functions”*

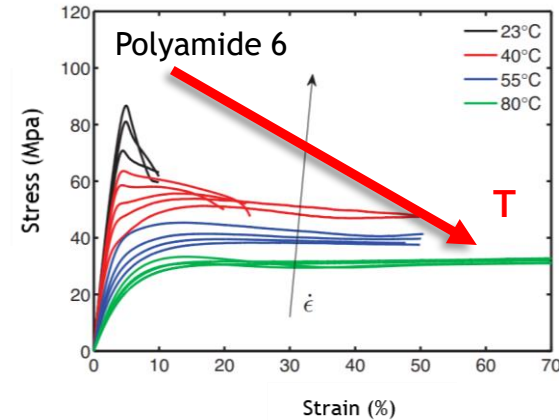


Understanding the unexpected and undesired high temperature mechanical behavior and failure mechanism of soft DD-TPEs

Loss of ductility with temperature

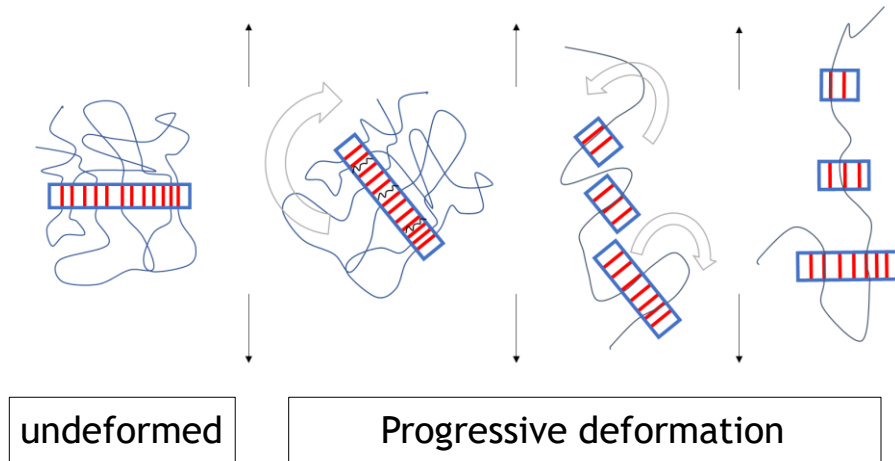


Typically ductility increases with temperature



Aim: Building-up a picture that explain the mechanical behavior and the failure mechanism

What happens inside the material upon deformation

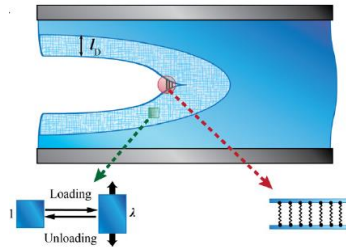


- What is the initial morphology and how does it change when the material is stretched?
- What happens when T is increased?
- When does the failure start?

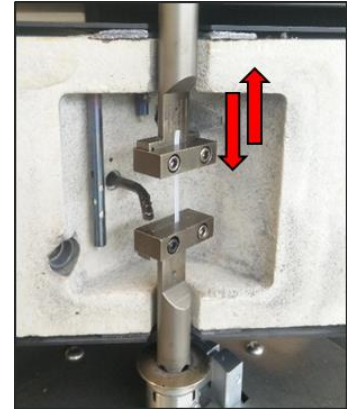
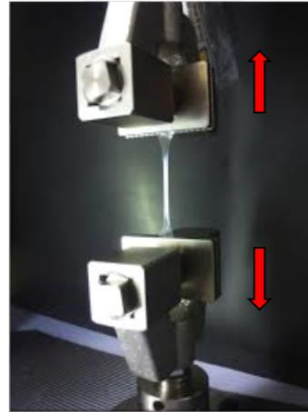
Methodology

Investigation of the linear and non-linear high-T mechanical properties

- Dynamic Mechanical Analysis (DMA)
- Tensile test
- Fracture test
- Cyclic tests



Xuanhe Zhao et al., 2015

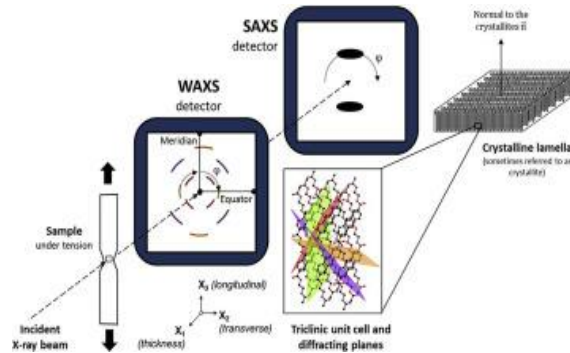


Methodology

Investigation of the high-T morphology without and under deformation

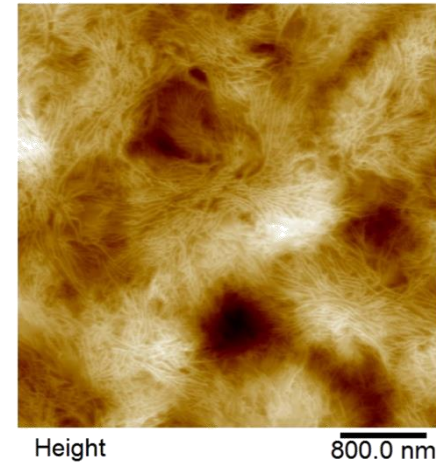
- In-situ X-ray
- AFM
- DSC
- FDSC

In-situ X-ray



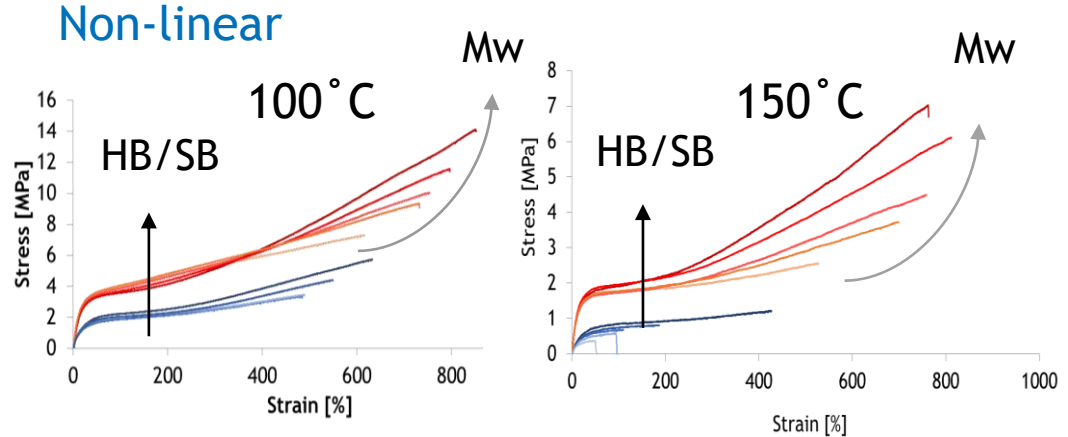
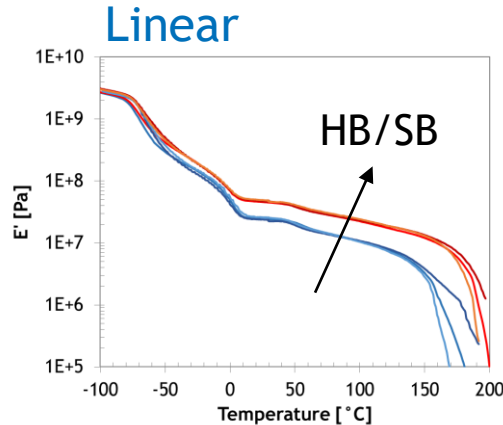
Donnay et al., 2016

AFM topology



Results obtained by tuning Mw and HB/SB:

Screening of the linear and non-linear high-T mechanical properties



Different regimes of deformation in which composition and molecular weight act with different dynamics

Training and conferences

- Specific training related to all the equipment necessary for sample preparation and testing
- Course in polymer physics (RPK, Utrecht)
- Rheology lectures and modelling (UCLouvain)
- DoDyNet project meetings
- Conferences in DSM

Expectation

- Mastering professional lab-expertise
- Improving knowledge in polymer physics and mechanics
- Use the acquired knowledge in an industrial environment



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