Network ABA triblock

Next steps:

Clément

Linear rheology:



• Blend sample with different chain length of PS to enhance phase separation

• Blend sample with short (8 kg/mol) and long (94 kg/mol) PnBA to swell the PnBA matrix



Shear rheology (with Consiglia)





- Used in a dual network (with Tetsuharu Narita)
- Fracture properties

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SAXS measurement (with Lauren



Samples: Dual networks

Polymer Information

Bastian

Cross Linker Information

Property	Value	Crosslinker 1:
Comonomer Composition	n-BA: 47,5 wt% 2-EHA: 47,5 wt% AA: 5 wt%	
Tg (static, DSC)	-45 °C	Crosslinker 2:
TG (dynamic, 10rad/s)	-25 °C	
Mn (D) [g/mol]	170000	
Mw (D) [g/mol]	1300000	
Mz (D) [g/mol]	3600000	F
Mw/Mn	7,7	

Lower integration limit: 10000 g/mol Upper integration limit: 20000000 g/mol



Samples: Dual networks

Bastian

No	Label	AC-Polymer	Cross Linker 1 (covalent) [wt%]	Cross Linker 2 (ionic) [wt%]
01	1291DW C33.04-18-01-01-01 / 26.09.2018		0,025	0,05
02	1291DW C33.04-18-02-01-01 / 02.10.2018		0,035	0,075
03	1291DW C33.04-18-01-02-01 / 19.11.2018	n-BA: 47.5 wt%	0,025	0,05
04	1291DW C33.04-18-02-02-01 / 19.11.2018		0,035	0,075
05	1291DW C33.04-19-01-01-01 / 19.02.2019		0	0,075
06	1291DW C33.04-19-02-01-01 / 19.02.2019		0,035	0
07	1291DW C33.04-19-03-01-01 / 16.05.2019	2-EHA: 47,5 wt%	0	0,106
08	1291DW C33.04-19-04-01-01 / 16.05.2019	AA: 5 wt%	0,118	0
09	DW C33.04-20-01-01-01 / 09.03.20	-	0,083	0
10	DW C33.04-20-02-01-01 / 09.03.20		0,153	0
11	DW C33.04-20-03-01-01 / 10.03.20		0,083	0,075
12	DW C33.04-20-04-01-01 / 12.03.20		0,118	0,075
13	DW C33.04-20-05-01-01 / 17.03.20		0,153	0,075









Properties studied so far:

Shear rheology

- Linear viscoelasticity in a broad range of frequency
- Aging of the networks
- Shear stress effect (non linear behavior)
- Step shear measurements (non linear behavior)

Modeling - extended Time marching algorithm

- Statistical composition of the network
- Prediction of linear viscoelastic properties
- Understanding the influence of the different parameters on the viscoelasticity (number and strength of stickers, Mw distribution)



Figure. LVE for two double networks differing for the amount of stickers. Lines correspond to the model predictions for the two systems. With circles are reported the experimental results.

Consiglia

Consiglia

Interesting to do:

- Extensional rheology
- Mechanical characterization
- Adhesion tests



Figure. LVE for two double networks differing for the amount of stickers. Lines correspond to the model predictions for the two systems. With circles are reported the experimental results.

Model TPE-E systems

Simone



Mw/Mn of total chain and PBT-blocks are ~2

Model TPE-E systems

New sam	pl	es:			Cł #	nain Lei blocks/	ngth 'chain			S	imone
		Soft block	Soft block		NA	n [kg/mg			Average	Tm [C]	
	1a	1000	60%		NIN [kg/mol]30				3.4	165	
SB Mn	2a	1400	60%	3	2	74	7	9	4.7	180	
1	3a	2000	60%	25	32	34	44	50	6.60	193	
	1b	2000	75%			33			4.3	165	
SB Mn	B Mn 2b 3000		75%			32			4.9	180	
Ŷ	1c	650	50%			28			3.4	165	

Interesting to do:

- Hard blocks are polydisperse: define <u>HB length distribution with NMR</u> as SB length and Mw change.
- Rheology: by varying SB/HB, Mn and SB length.
- FTIR or Raman to quantify change in crystallinity/orientation during deformation or change in temperature
- ...more ideas?