INTERACTIVE POLYMER MATERIALS RESEARCH CENTER

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Effect of dynamic linker and crosslink density on dynamic mechanical and rheological properties

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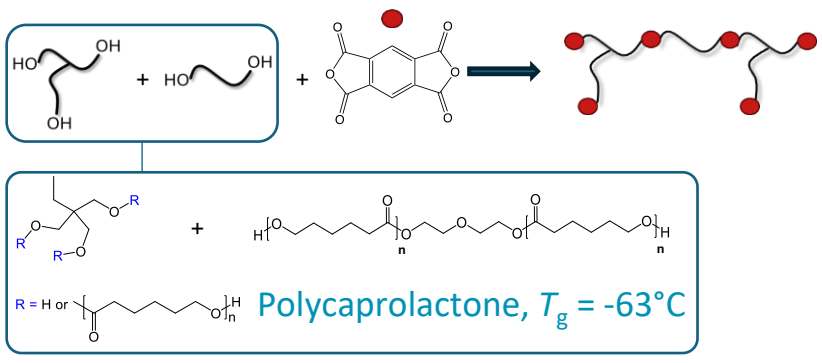
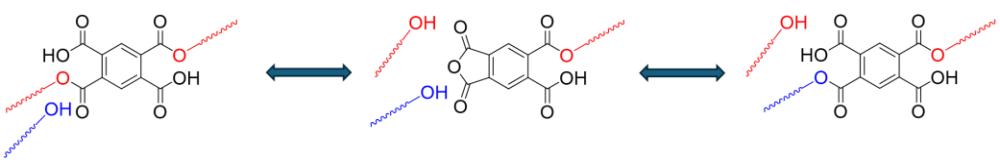
Introduction

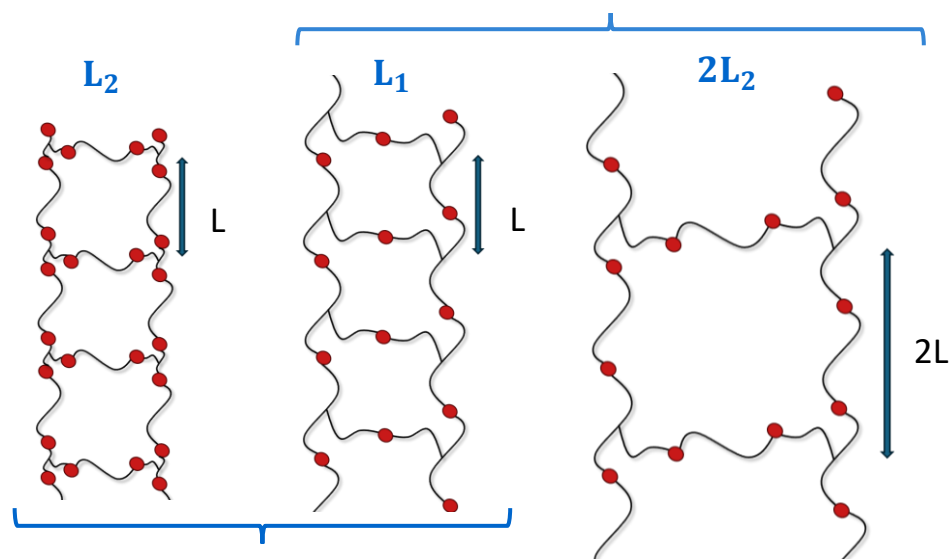
transesterification-based Dynamic Covalent Networks



dissociative mechanism

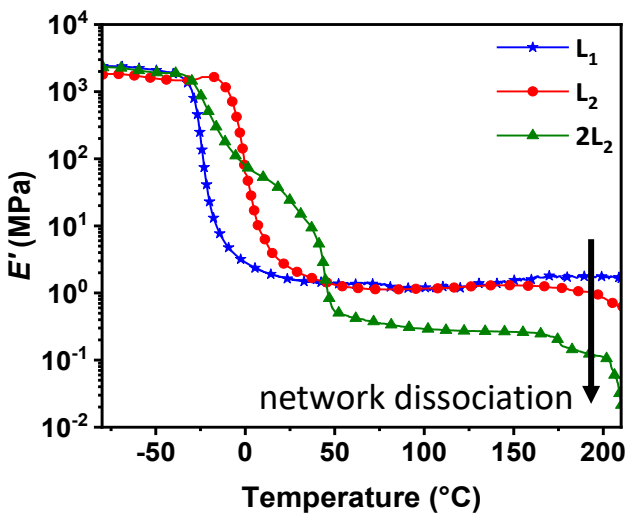


different crosslink density, constant dynamic linker density



constant crosslink density, different dynamic linker density

Viscoelastic behavior in elongation



lower crosslink density

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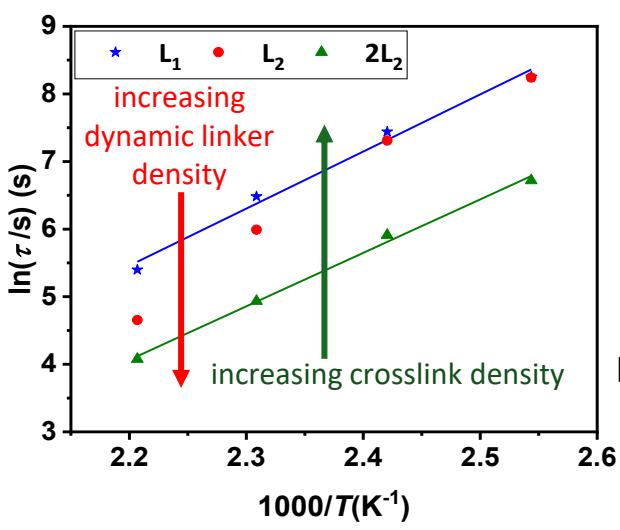
lower rubbery plateau modulus

increased number of dynamic links between crosslinks

↓

network dissociation

Dynamic bond exchange rate



lower crosslink density

↓

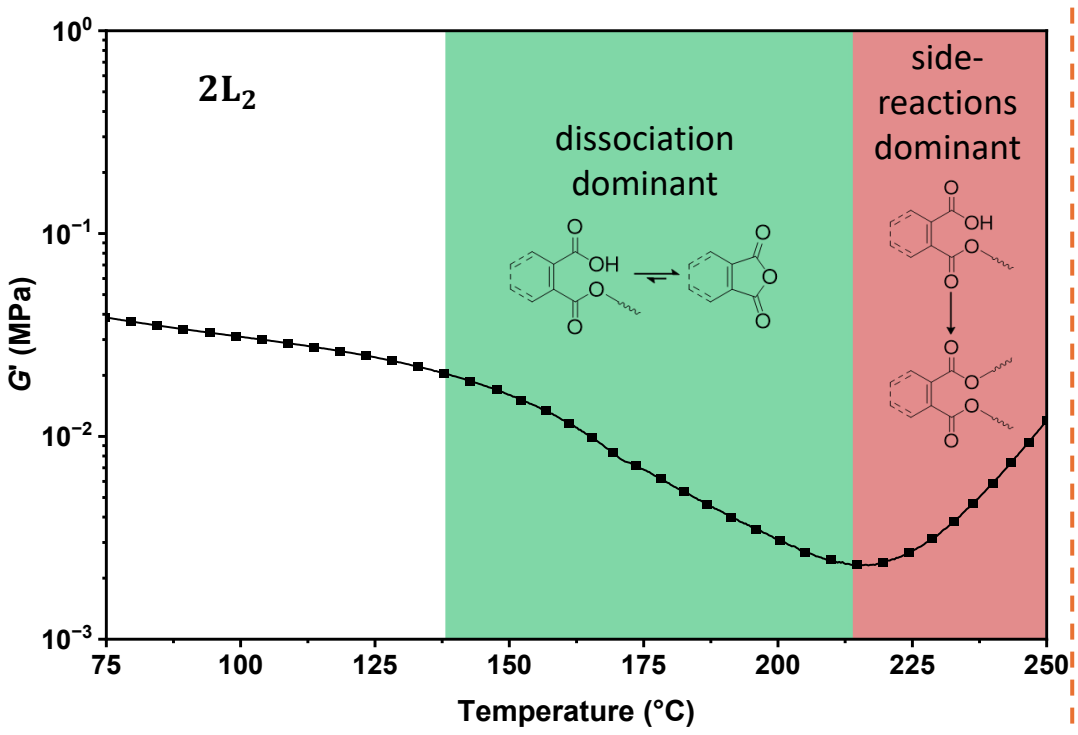
lower relaxation times

higher dynamic linker density

↓

lower relaxation times at elevated temperatures

Network dissociation vs. side-reactions



Processing via extrusion

low temperature, long residence time

high temperature, short residence time

finding the sweet spot

Conclusion

	L_1	L_2	$2L_2$
Rubbery plateau	1 MPa	1 MPa	0.3 MPa
Stress relaxation	Slowest	Faster	Fastest
Viscosity	High	Low	Very low
Viscous behavior onset	Lowest	Higher	Highest

Lower crosslink density and higher dynamic linker density lead to more viscous behavior

Contact

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