

# FULLY BIO-BASED POLYMERS DERIVED FROM ACRYLATED EPOXIDIZED SOYBEAN OIL BY THIOL-ENE REACTION

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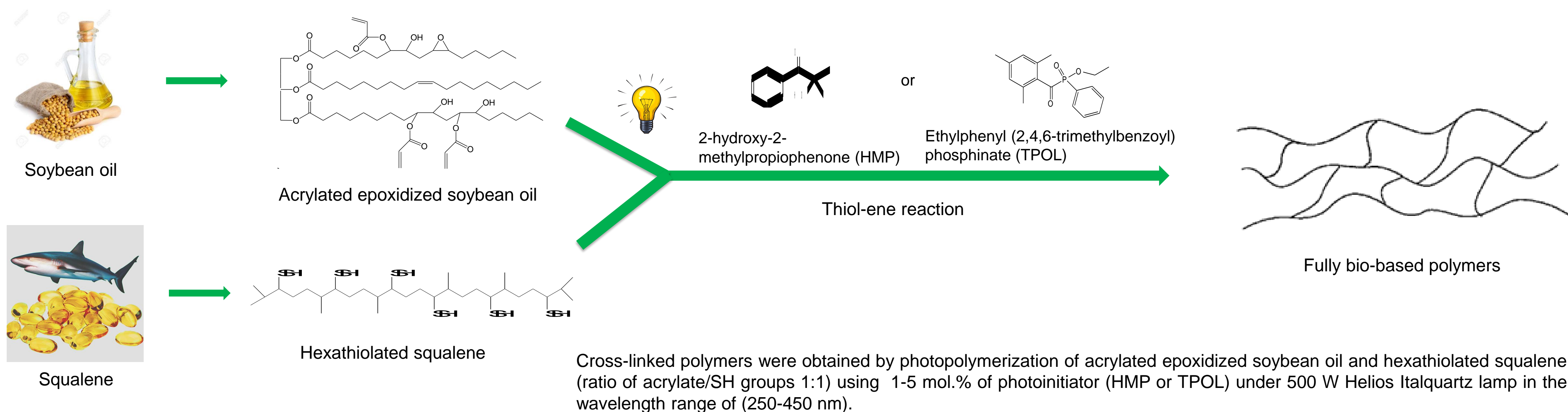
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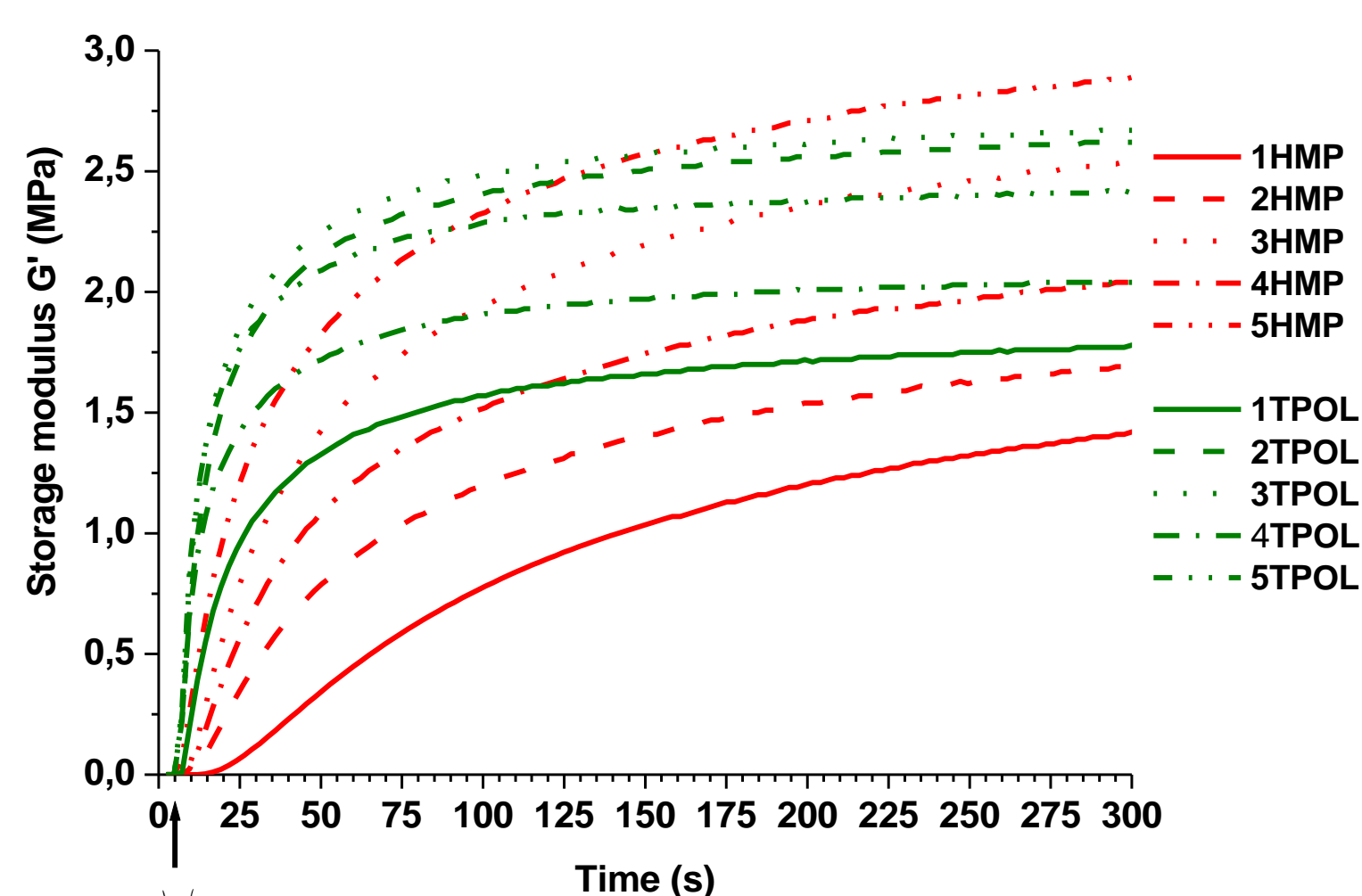
## MOTIVATION

It has been estimated that more than 8.3 billion tonnes of plastics have been produced over the past decades and about 60 % of plastics have ended up either in landfills or in the natural environment. With the rapid growth of consumerism, research on innovative starting materials for preparation of polymers may help to reduce the negative impact of petroleum-based plastic materials on the global ecosystem and on animal and human health. Therefore, photochemical thiol-ene coupling reaction of squalene was performed to obtain thiol functional groups. Then, hexathiolated squalene was used as a cross-linker in UV curing reactions with acrylated epoxidized soybean oil. Two photoinitiators, 2-hydroxy-2-methylpropiophenone and ethylphenyl (2,4,6-trimethylbenzoyl) phosphinate, were tested in different quantities.

## PHOTOPOLYMERIZATION



## PROPERTIES OF POLYMERS



Storage modulus determined by UV curing test with rheometer MCR302 from Anton Paar equipped with the plate/plate measuring system. The samples were irradiated using UV/Visible spot curing system OmniCure S2000.

Polymer	Yield of Insoluble Fraction <sup>1</sup> (%)	T <sub>g</sub> <sup>2</sup> (°C)	T <sub>dec.-10%</sub> <sup>3</sup> (°C)
1HMP	68	-20	333
2HMP	85	-6	333
3HMP	90	-7	330
4HMP	88	-9	331
5HMP	88	-11	331
1TPOL	96	-1	340
2TPOL	97	-1	342
3TPOL	98	0	344
4TPOL	97	-2	340
5TPOL	96	-2	334

<sup>1</sup> After Soxhlet extraction with chloroform for 24 h;

<sup>2</sup> Glass transition temperature estimated by DSC;

<sup>3</sup> Temperature at the weight loss of 10 % obtained from TGA curves.

## CONCLUSIONS

- ❖ Hexathiol was prepared from squalene as a starting biobased material;
- ❖ Hexathiolated squalene was used as monomer in the thiol-ene reaction with acrylated epoxidized soybean oil using two different photoinitiators, 2-hydroxy-2-methylpropiophenone and ethylphenyl (2,4,6-trimethylbenzoyl) phosphinate, in different quantities;
- ❖ Polymers had the higher storage modulus and thermal characteristics due to the higher yield of insoluble fraction when ethylphenyl (2,4,6-trimethylbenzoyl) phosphinate was used in the compositions.;
- ❖ The obtained polymers of the present study can be considered as fully bio-based.

## ACKNOWLEDGEMENTS

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