

# Synthesis and properties of thermoplastic polyurethane for crash pad

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## Abstract

Thermoplastic polyurethane (TPU) series were synthesized by mixing poly tetramethylene glycol (PTMG), polyethylene glycol(PEG) and polypropylene glycol (PPG) polyols, methylene diphenyl diisocyanate(MDI), hexamethylene diisocyanate(HDI) and isophorone diisocyanate(IPDI) Isocyanates and 1,4-butandiol (1,4-BD) chain extender as a function of different NCO index. Synthesized TPU materials were analyzed and evaluated using universal test machine(UTM), viscometer and fourier transform infrared spectrometer(FT-IR) and physical properties of materials exhibited high mechanical properties and light weight and high functionality for instrument panel applications of vehicle.

## Objective

1. Blending Polyol and Isocyanate contents to make a TPU
2. Viscosity comparison according to TPU synthesis time
3. Evaluation the physical properties and comparisons according to NCO index

### Blending of Polyol with Isocyanate

NCO index of high mechanical properties

Comparison of properties after triol addition polymerization

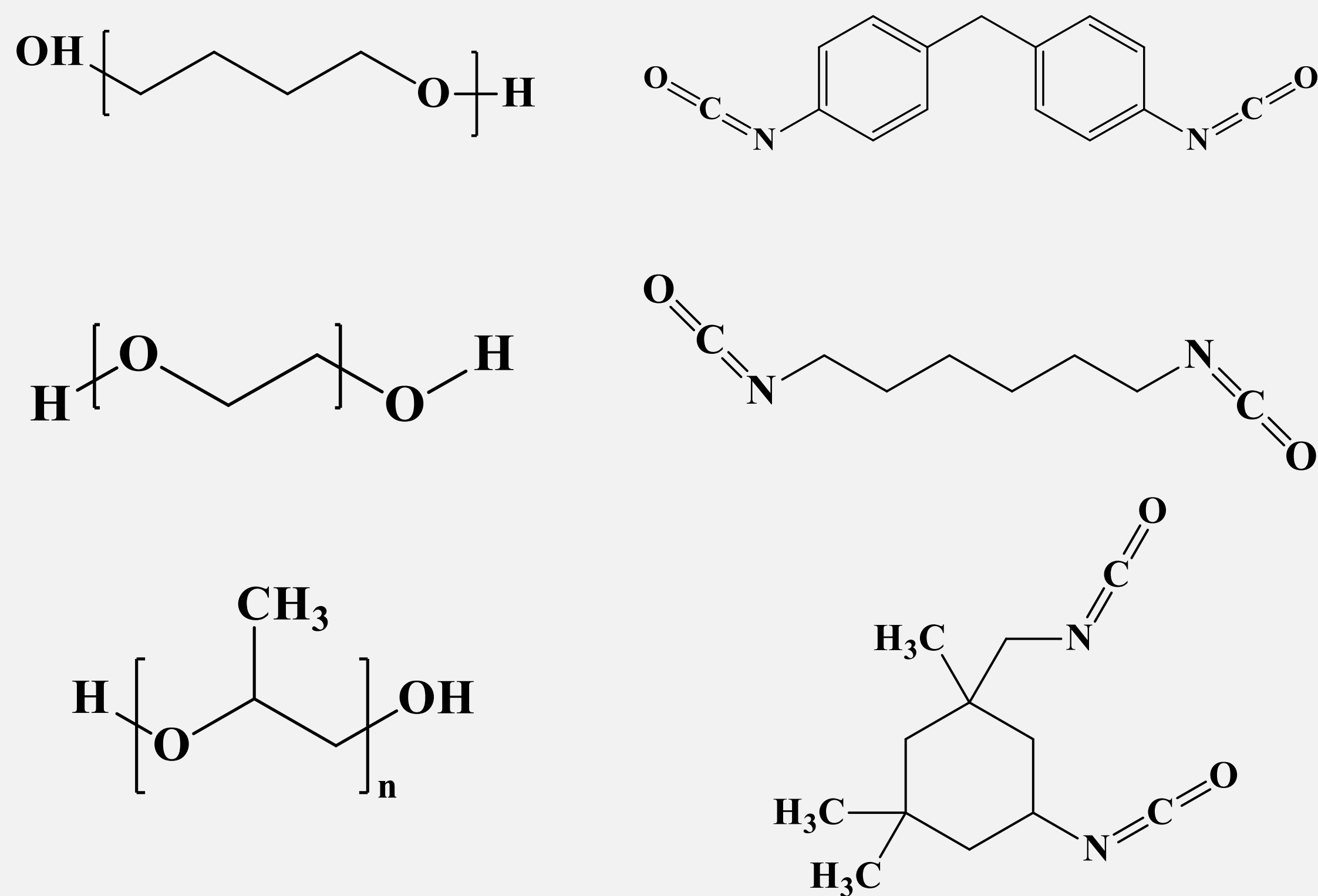
Future additives, reinforcing agents and plasticizer combinations

## Experimental

Polyol (PTMG, PEG, PPG) / Isocyanate (MDI, HDI, IPDI)

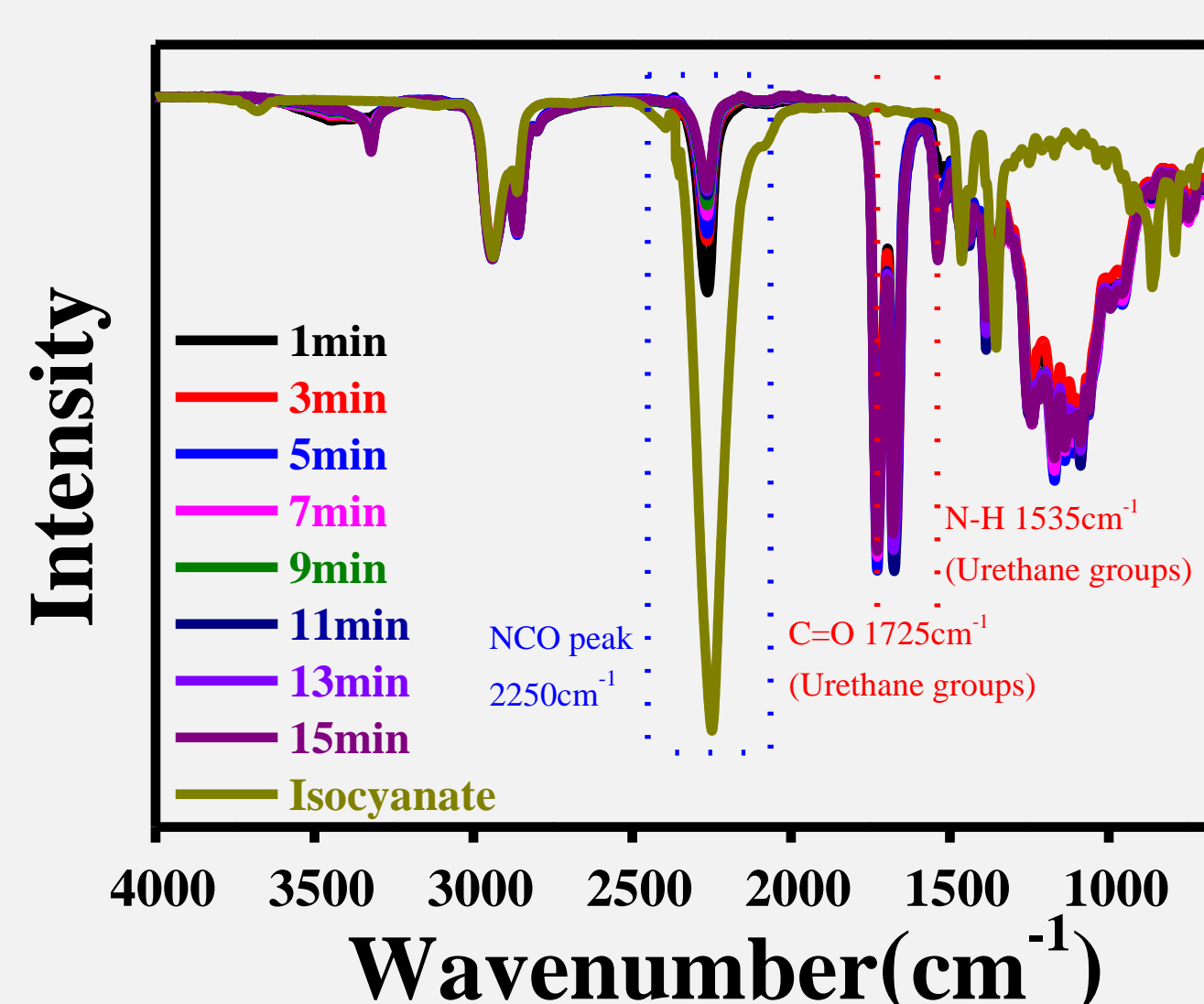
Chain extender (EG, BD, etc)

Please note that it is difficult to provide materials and synthesis schemes as the experiment is proceeding.

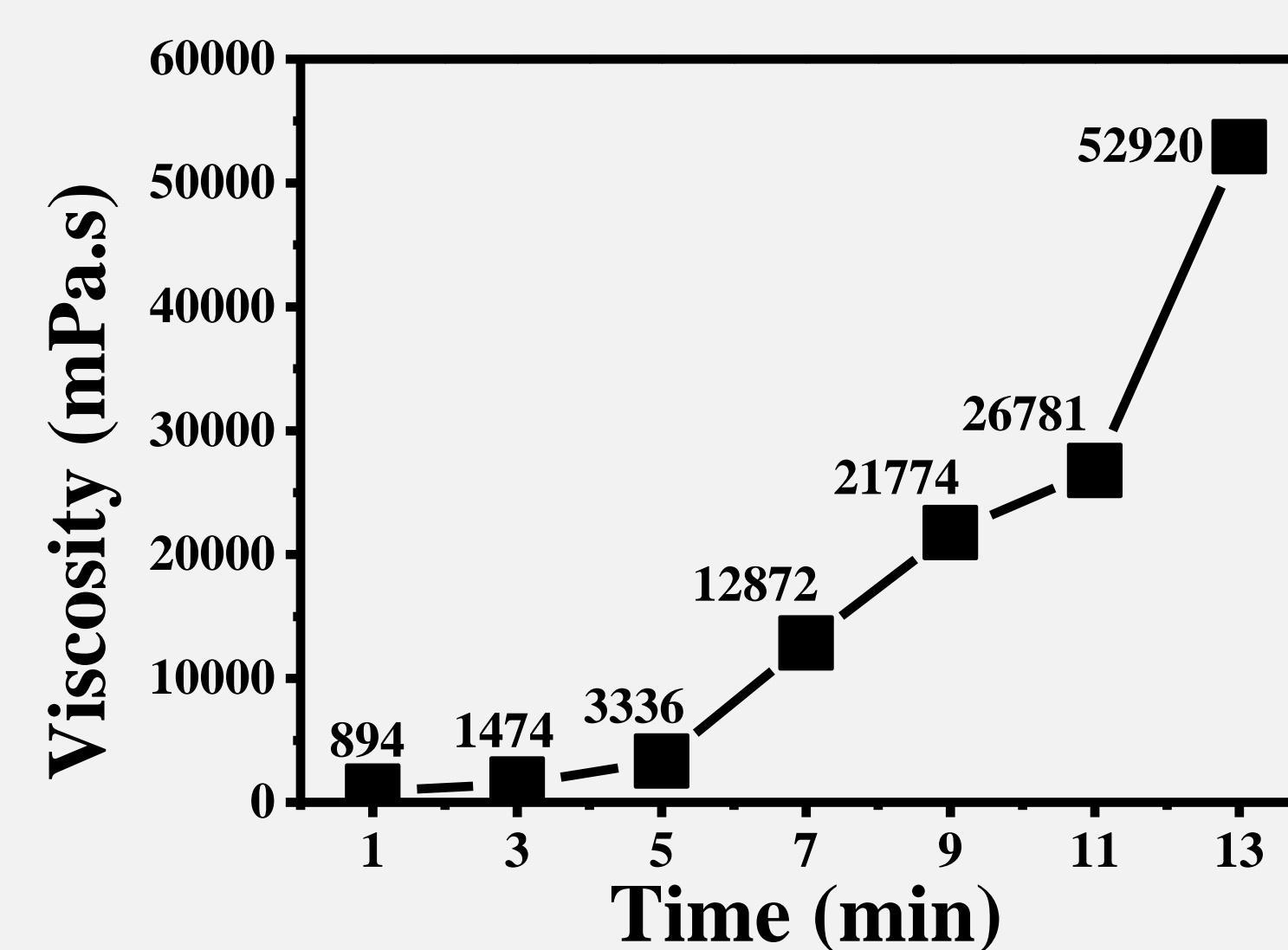


## Results

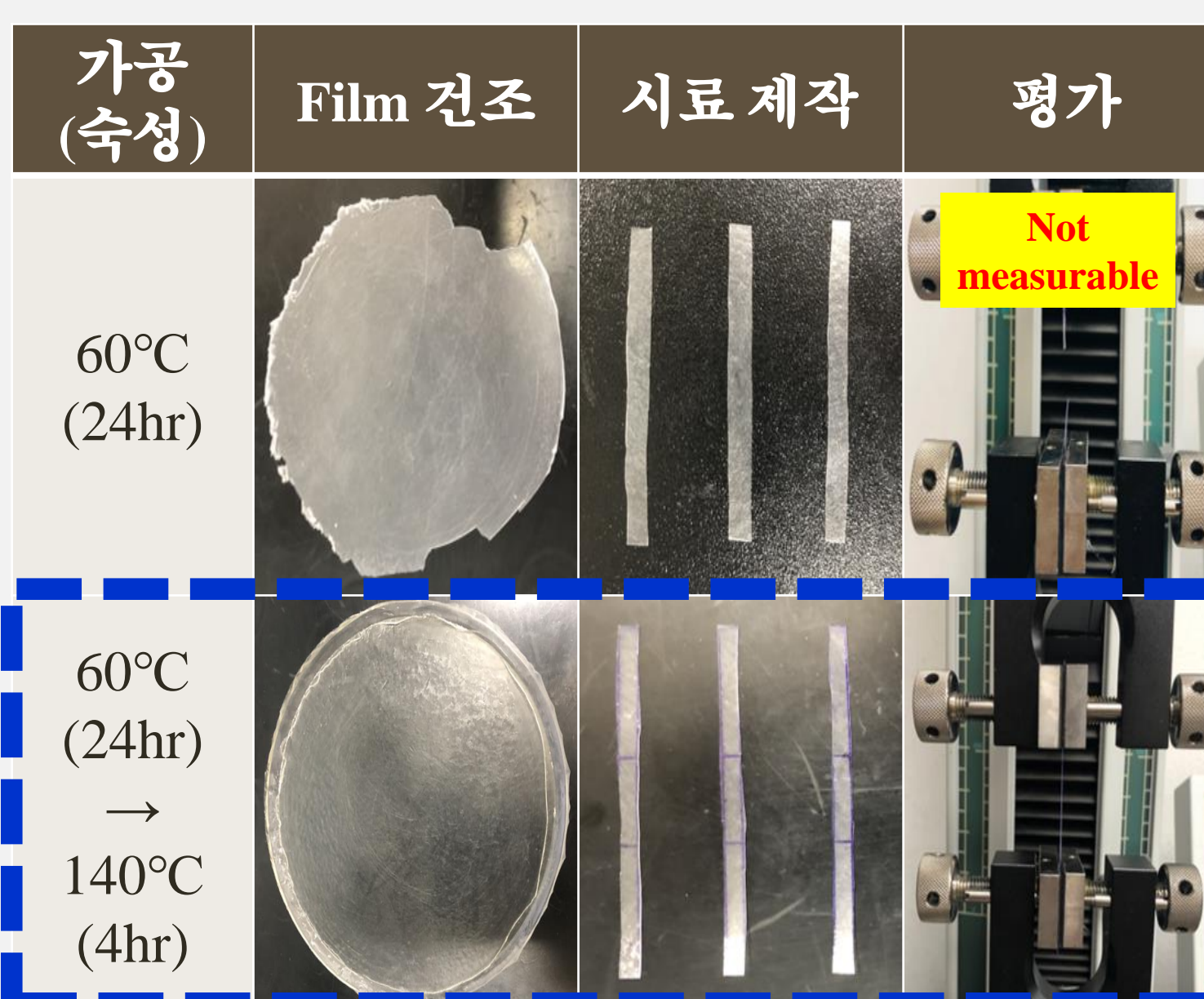
### FT-IR



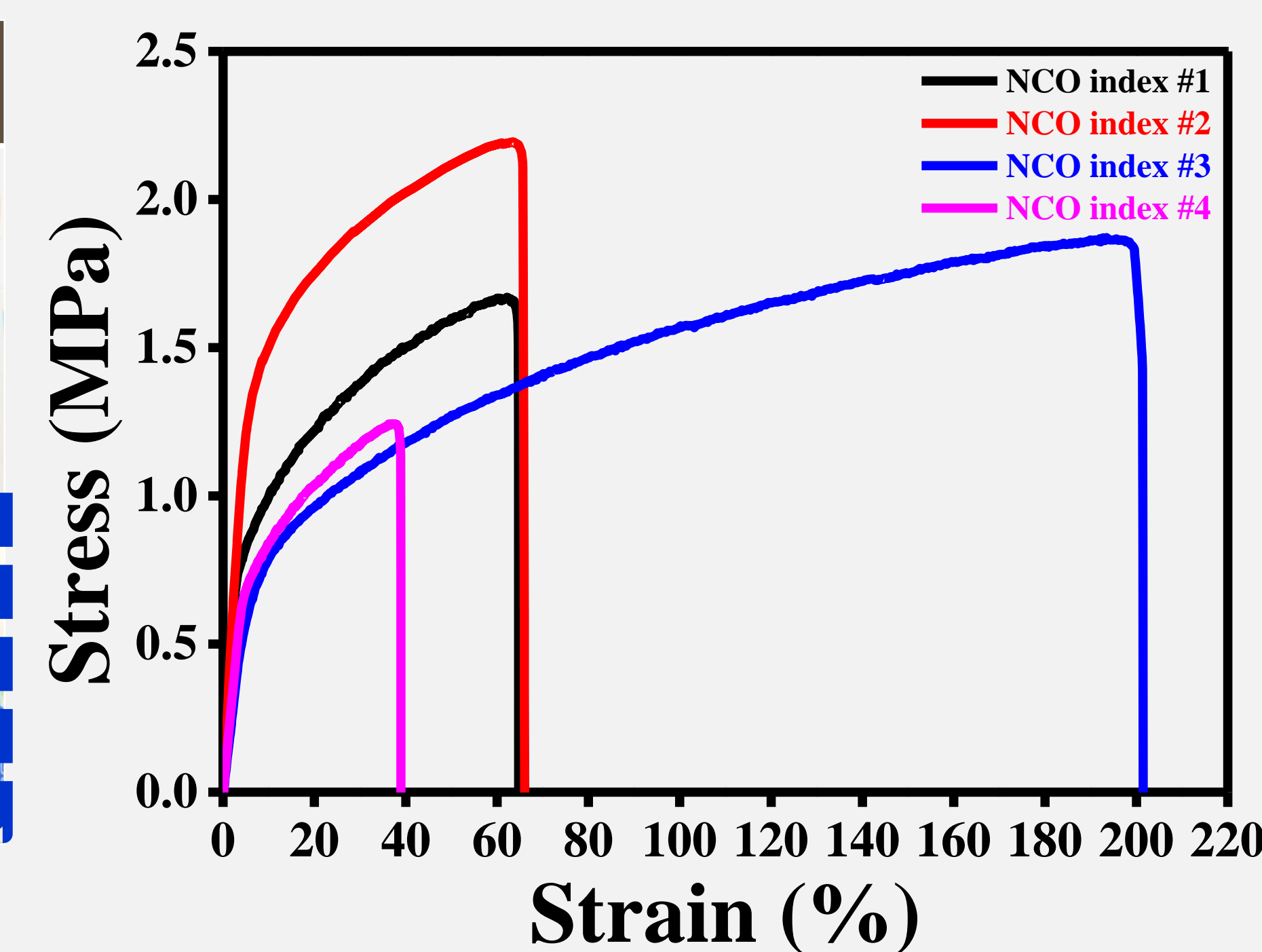
### VISCOSITY



### SAMPLE



### UTM



### Measures

	Young's Modulus (MPa)	Maximum Stress (MPa)	Percent Strain (%)
#1	0.0268	1.6699	62.2163
#2	0.0399	1.9836	49.773
#3	0.0063	2.2758	363.373
#4	0.0335	1.2432	37.1246

## Conclusion

- Successful instrument panel TPU synthesis
- Structural analysis and viscosity measurement of synthesized TPU
- Check the change of mechanical properties according to the change of NCO index (Excellent mechanical properties of NCO index #3)

## Acknowledgement

This work was supported by Industrial Strategic Technology Development Program (High strength, low density UHMWPP polymer composite And impact resistance, antifricition applied product development of automotive, 20011130)