

Synthesis of eco-friendly PU adhesive based on a bio-polyol and silane-epoxy for bio tackifier adhesive material

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Abstract

Eco-friendly PU adhesive series were synthesized using castor oil-based polyol, toluene diisocyanate (TDI) and silane-based epoxy derivatives as a blending material. The crosslinking-agent used the bis(hexamethylene)triamine and curing proceeded for 24 h at 100 °C. The crosslinked PU adhesive series were characterized by Fourier transform infrared spectroscopy (FT-IR), gel permeation chromatography (GPC). The adhesion properties were carried out in universal testing machine (UTM). Adhesive strength of silane epoxy blended PU adhesive was measured high adhesion strength. Castor oil based PU and silane based epoxy adhesive are low adhesion strength. The resulting PU adhesive based on bio polyol and silane epoxy can be an excellent addition for using as a bio tackifier adhesive material.

Objective

1. Blending Castor oil and Isocyanate contents to make a PU_adhesive
2. Addition of epoxy to improve adhesion
3. Evaluation of mechanical properties and adhesion

Blending of Castor oil with Isocyanate

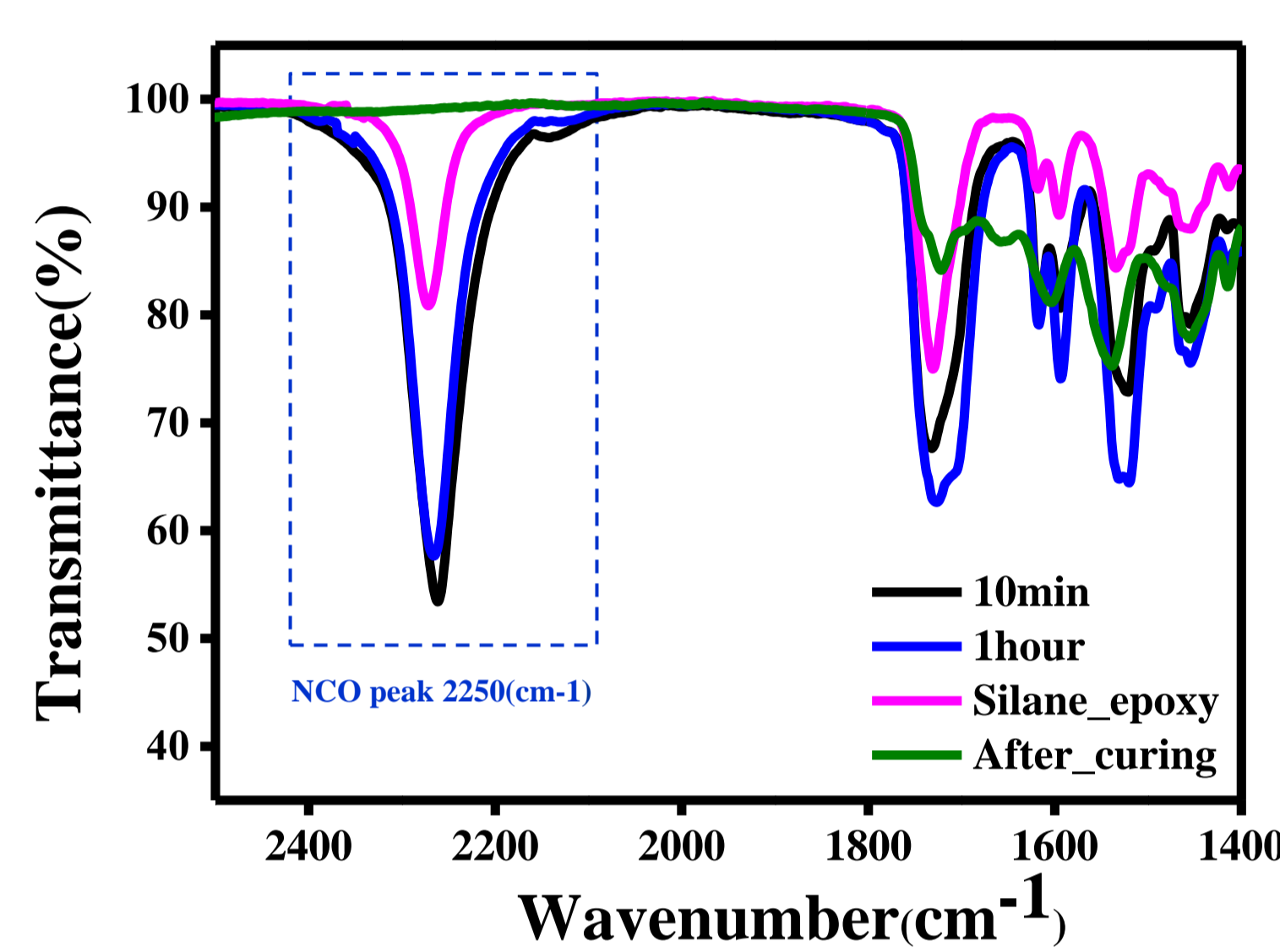
NCO index of high mechanical properties

Comparison of properties after addition of epoxy

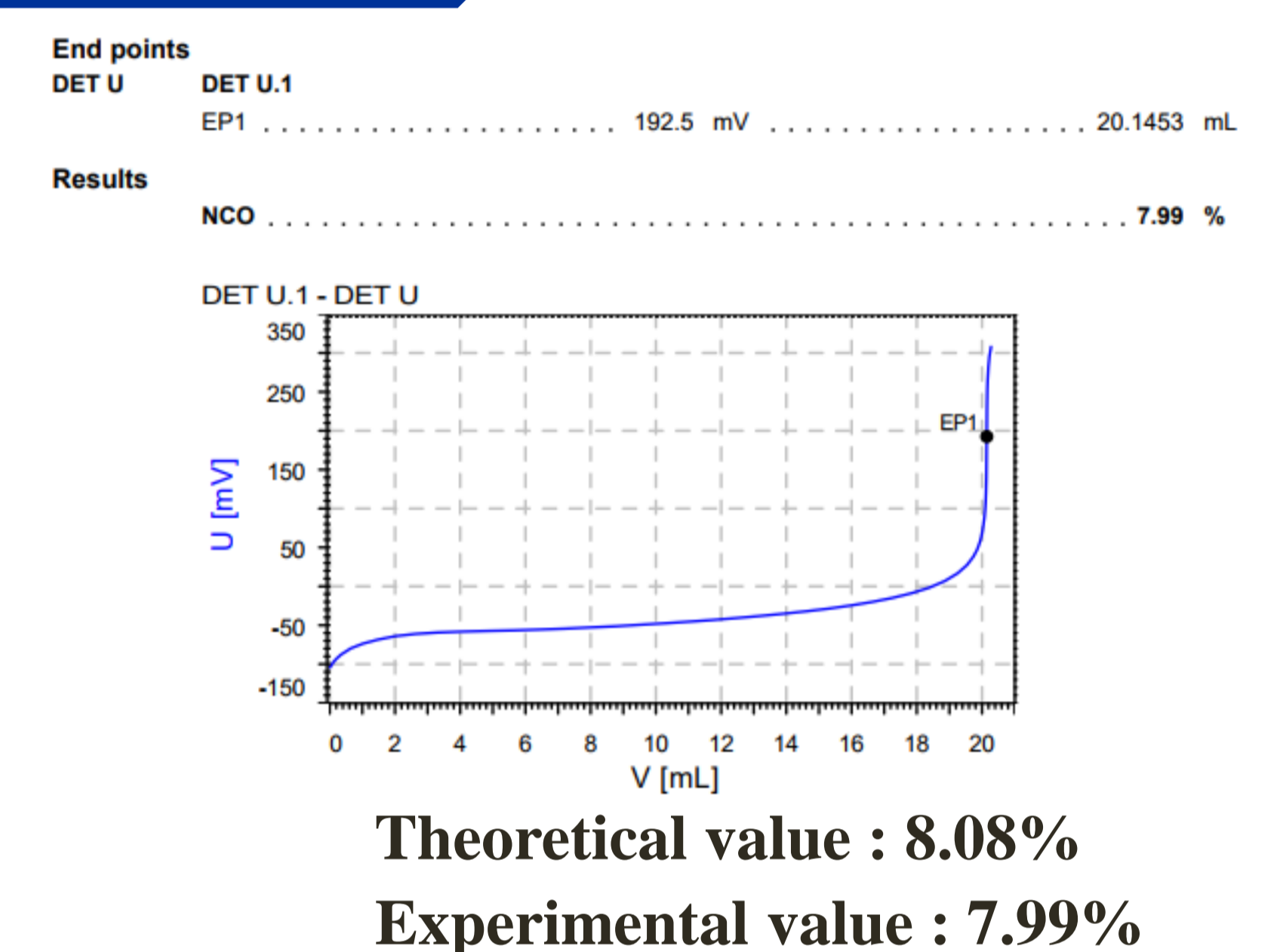
Increased adhesion due to urethane and epoxy properties

Results

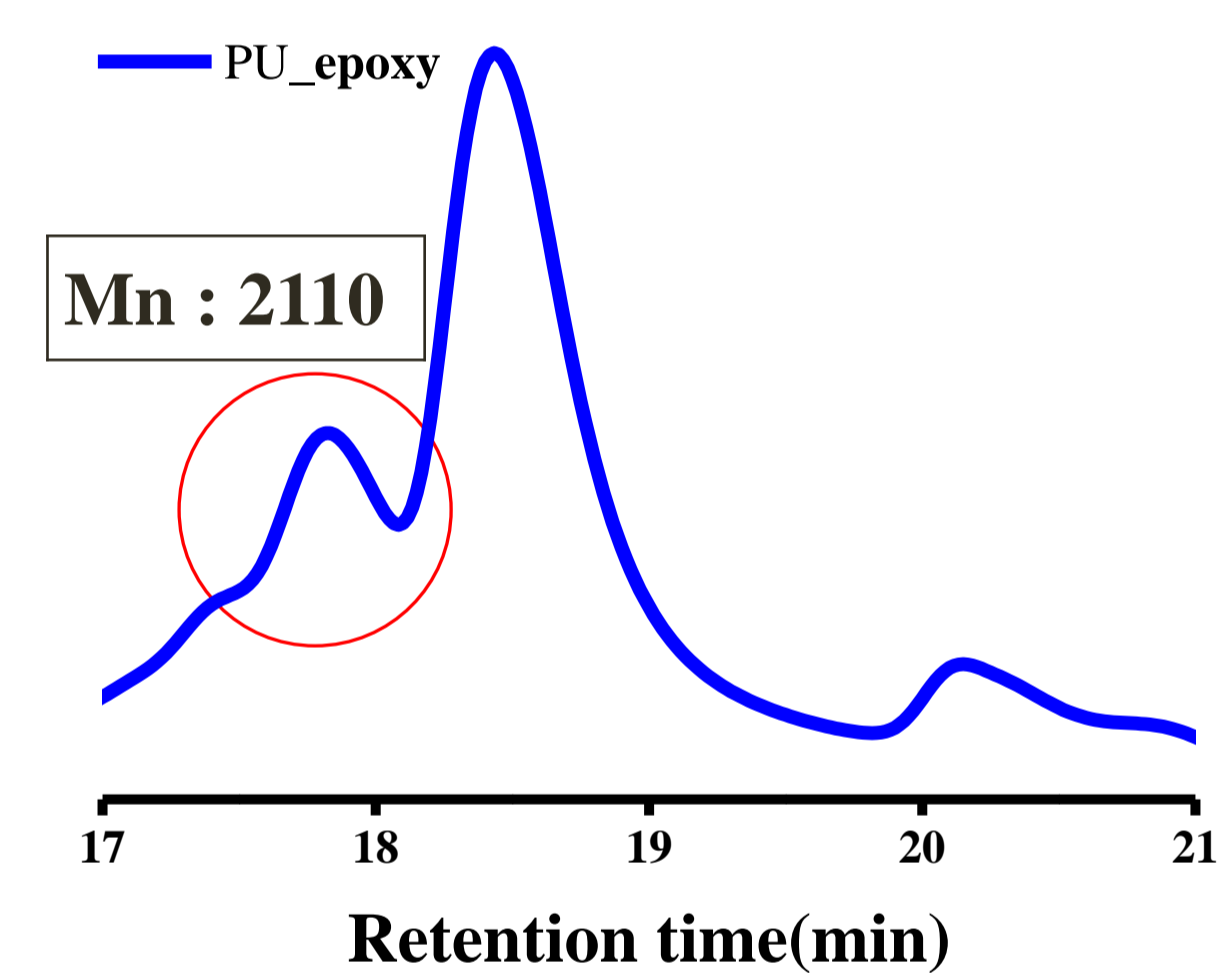
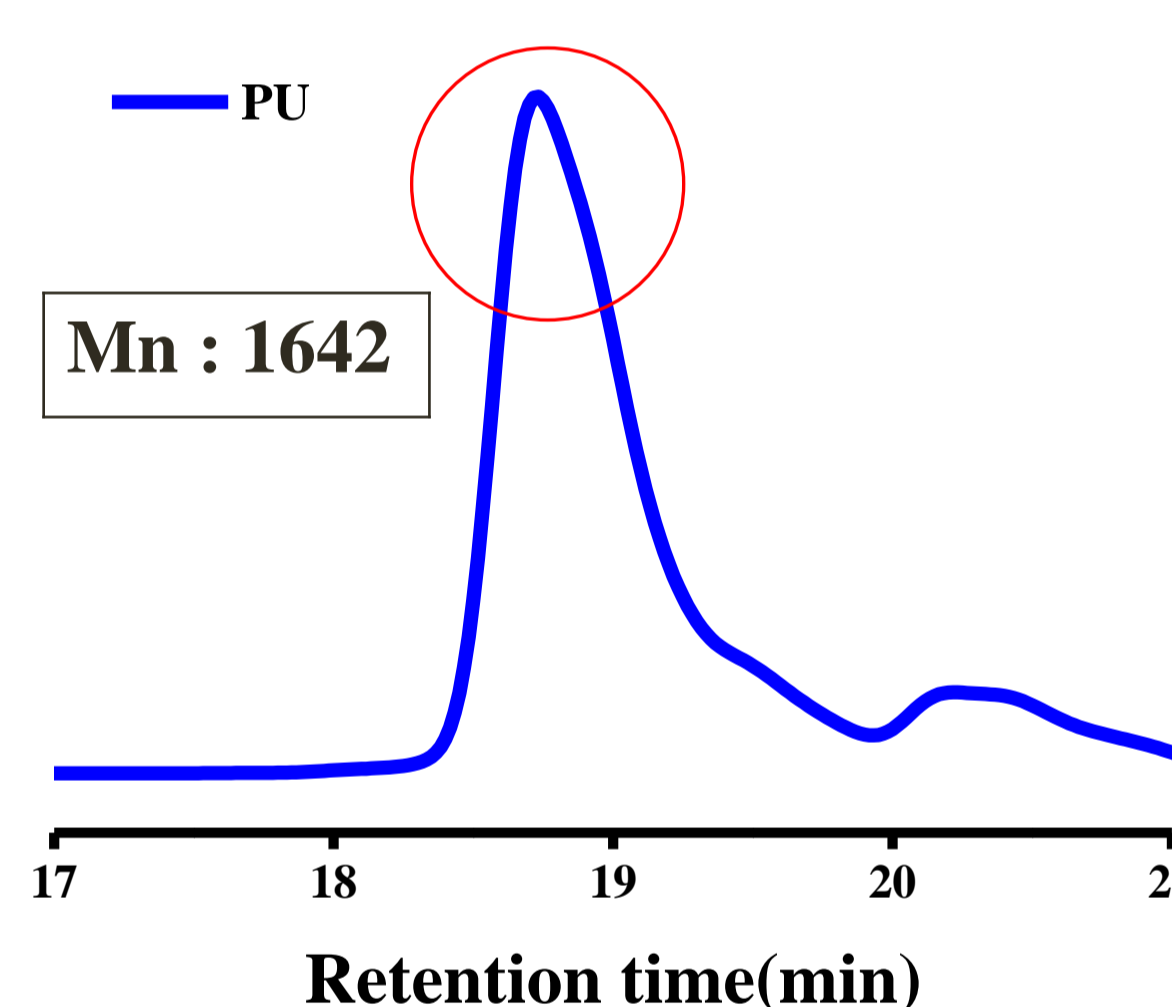
FT-IR



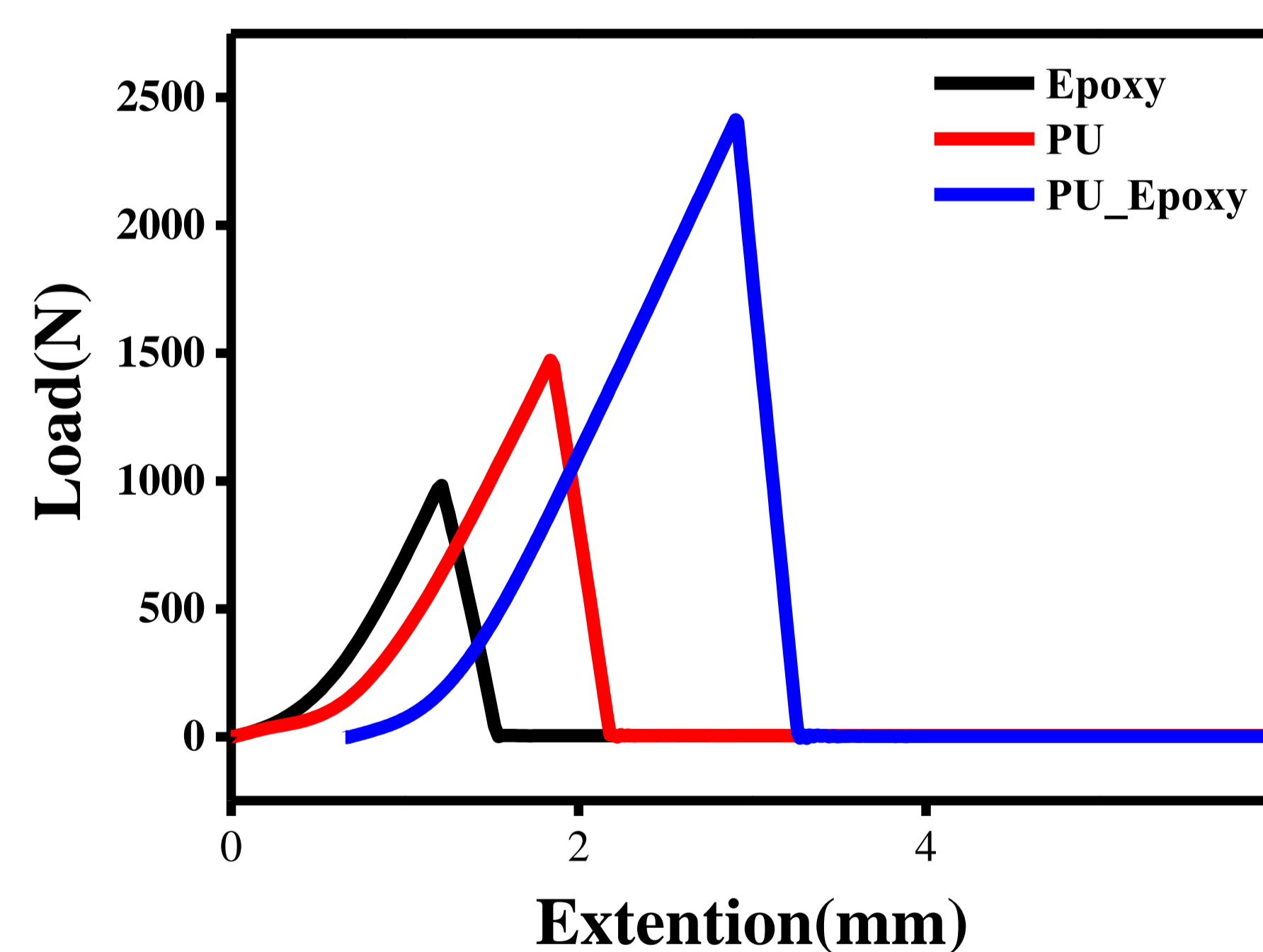
NCO%



GPC



UTM



Silane_epoxy

3.05MPa

PU

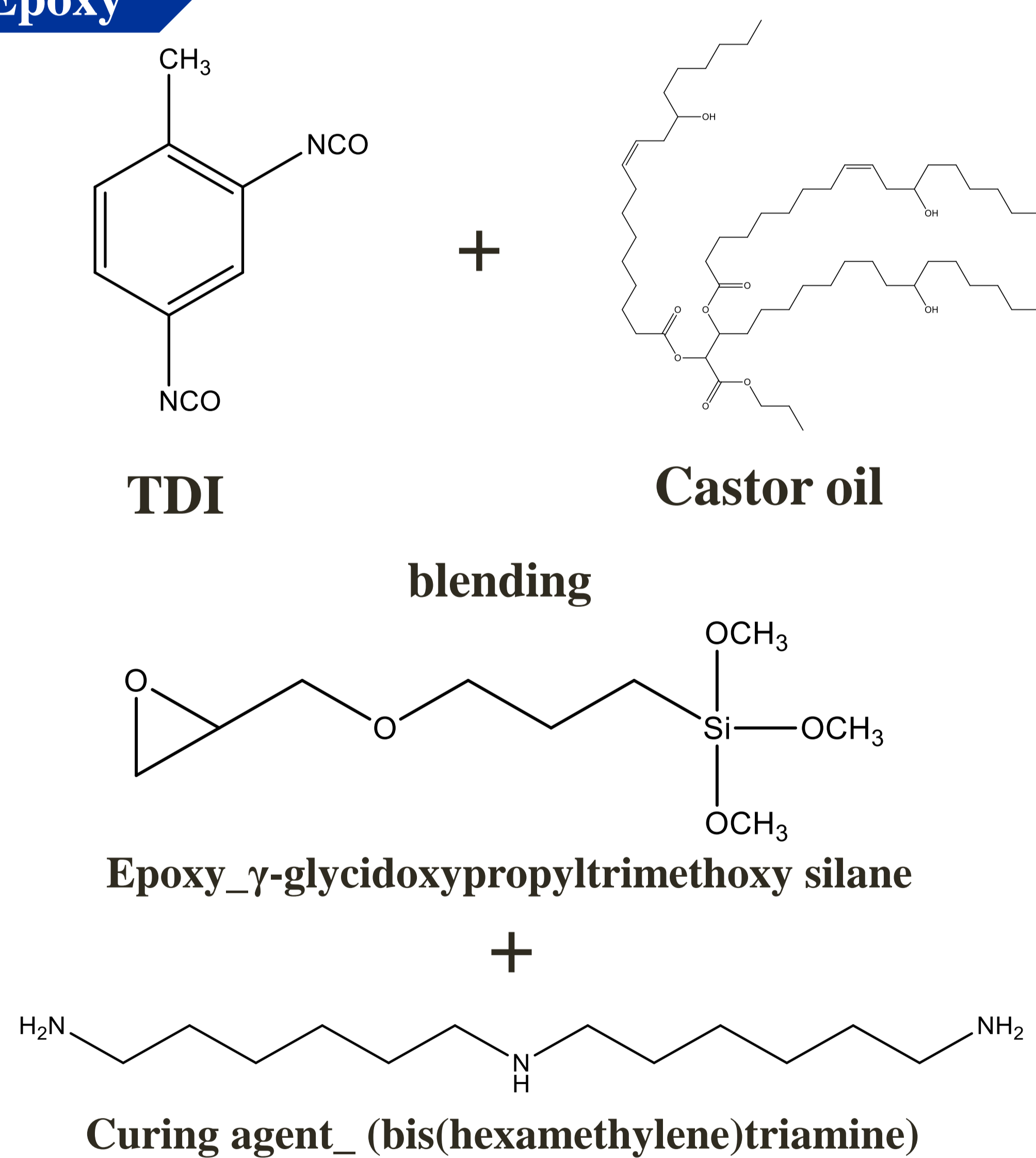
4.57Mpa

PU_Epoxy

7.52MPa

Experimental

PU_Epoxy



Conclusion

- Successful PU-Prepolymer adhesive synthesis
- Structural analysis and NCO% measurement of synthesized PU_prepolymer adhesive
- PU and Epoxy was measured lower than 5MPa / PU_Epoxy was measured high adhesion strength (7~8MPa)
- Increased mechanical properties and improved adhesive strength blending with polyurethane prepolymer adhesive and epoxy

Acknowledgement

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