

Transparent and hydrophobic properties of polyurethane chemically-incorporated to poly(dimethylsiloxane)

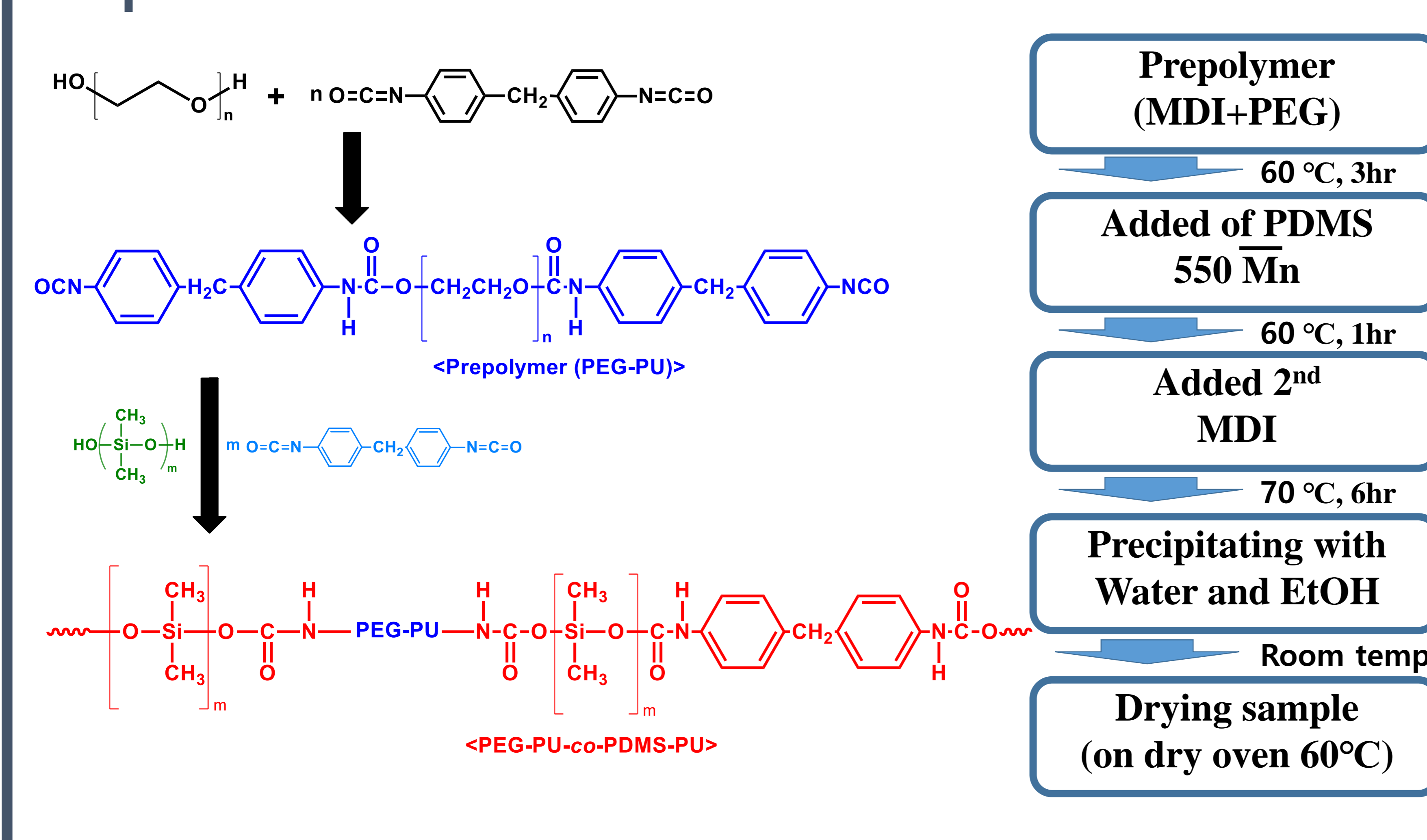
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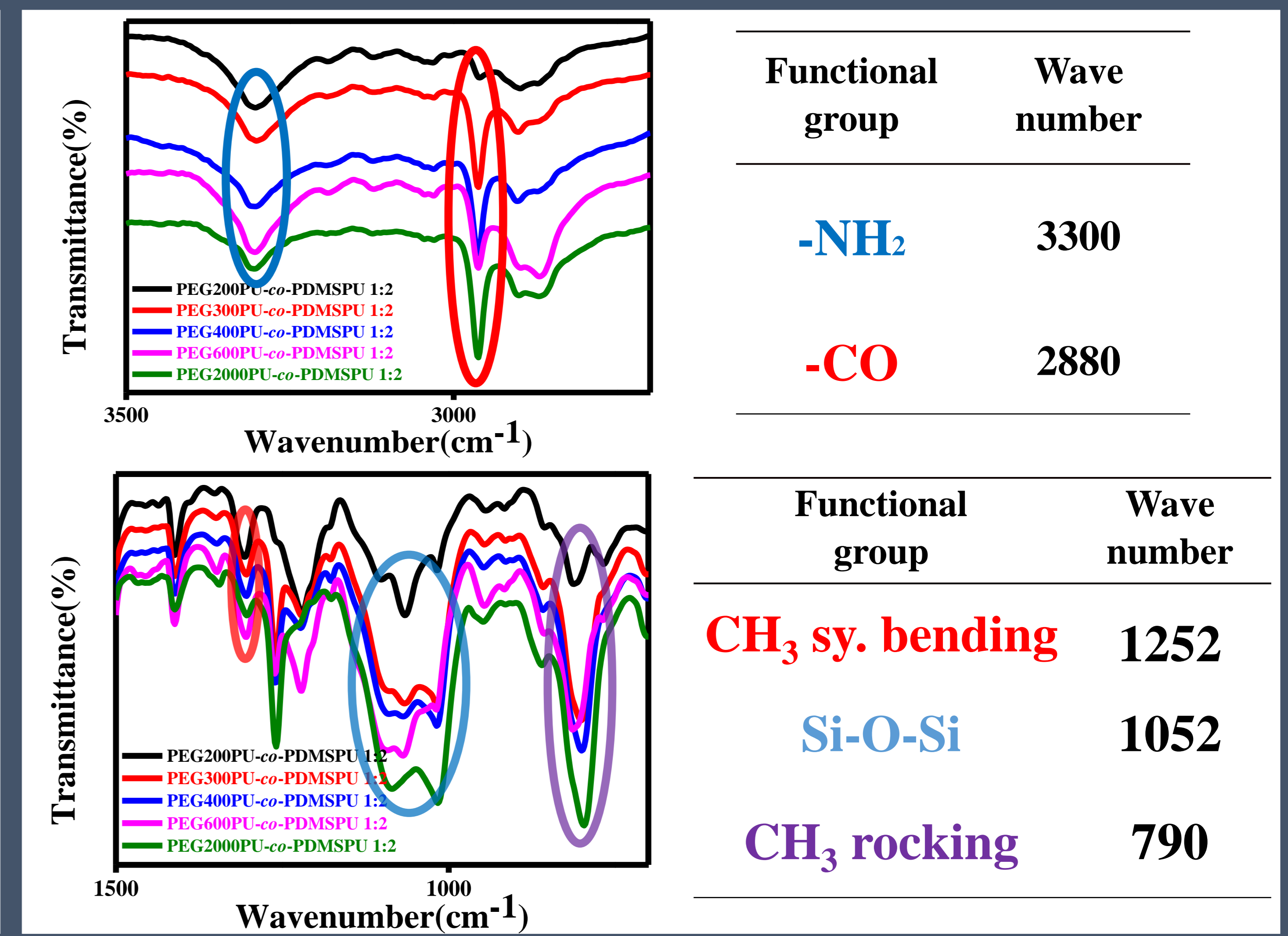
Abstract

Polyether-polydimethylsiloxane (PDMS) polyurethane (PU) are successfully synthesized using three different molecular weights (= 550, ~6000, ~110,000) of siloxane polyol and one fixed molecular weight of polyethylene glycol (PEG) polyol as a soft segment. Wettability and surface properties of PDMS-PU are evaluated with respect to PDMS molecular weight and PDMS mol %. PDMS enrichment at the air-polymer interface could result from the phase separation effect between PDMS segments and urethane segments. Surface energy of PDMS-PU is decreased with increasing PDMS molecular weight and content. PDMS segments in PCDMS-PU attributes to high- or super-hydrophobic surface and high contact angle with water, which could lead to the potential water-barrier property. The optical transmittance and water vapor transmission rate of PDMS-PU are investigated to use as an encapsulation material for the environmental protection and industrial applications.

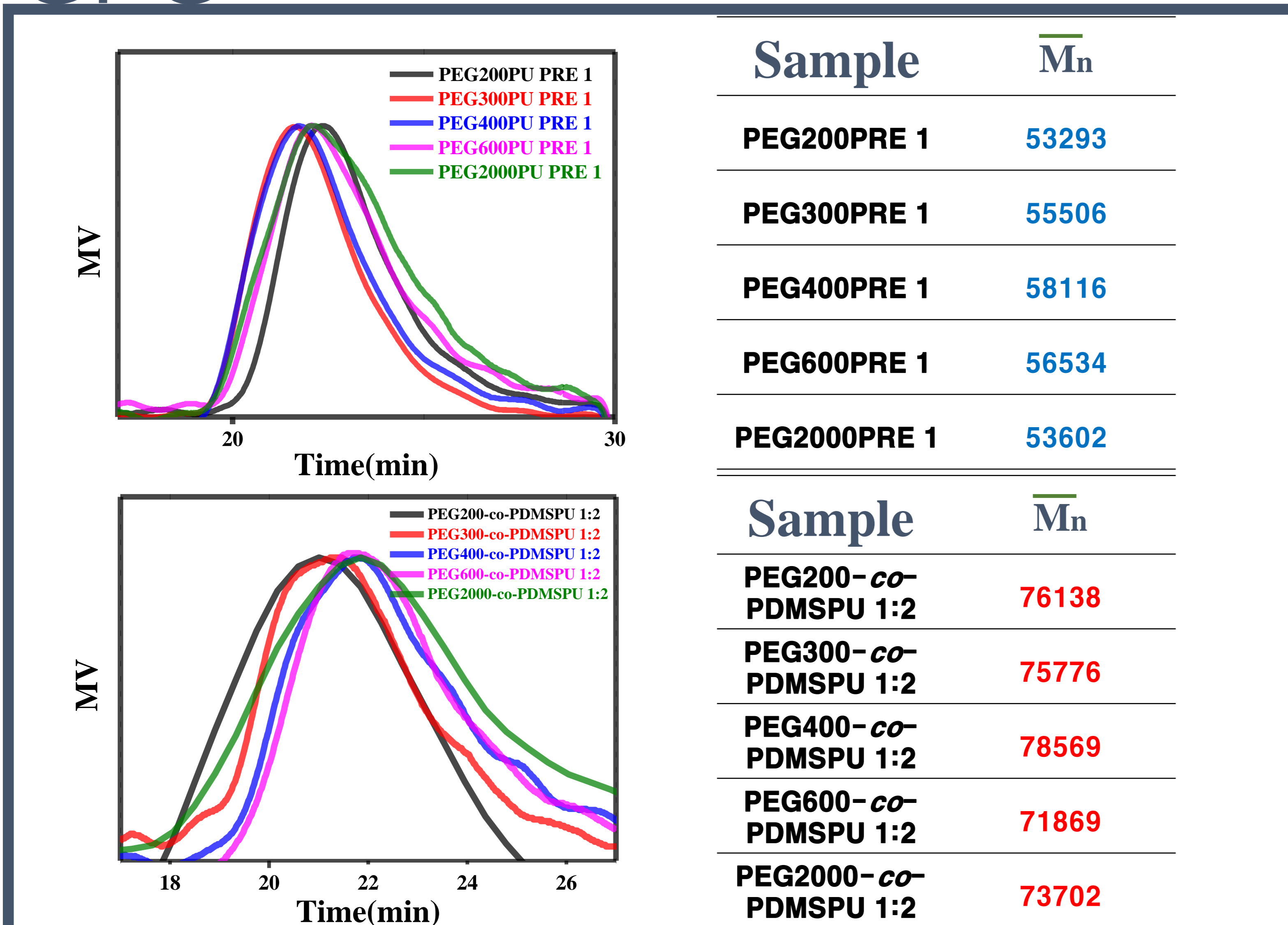
Experiment



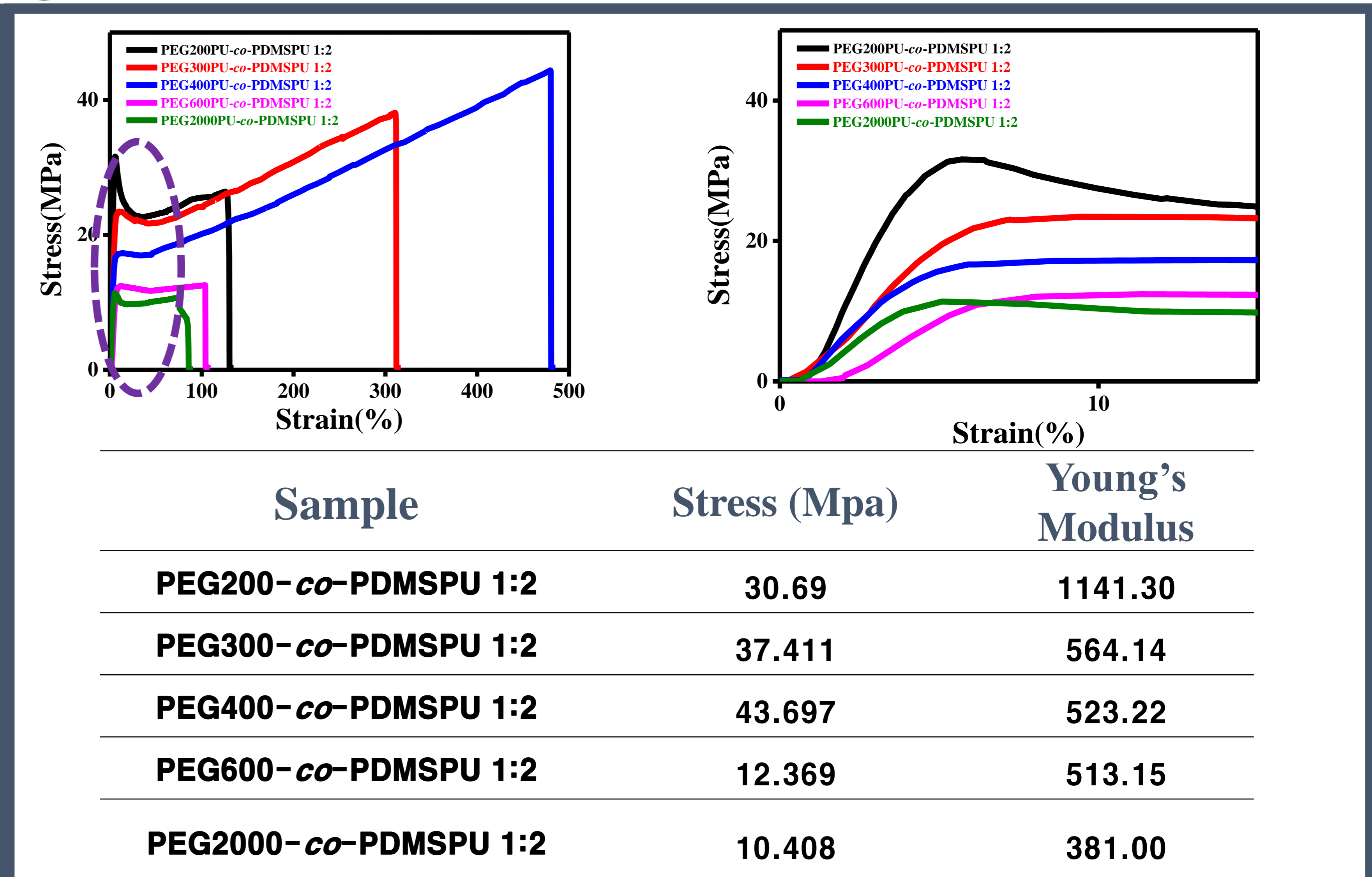
FT-IR



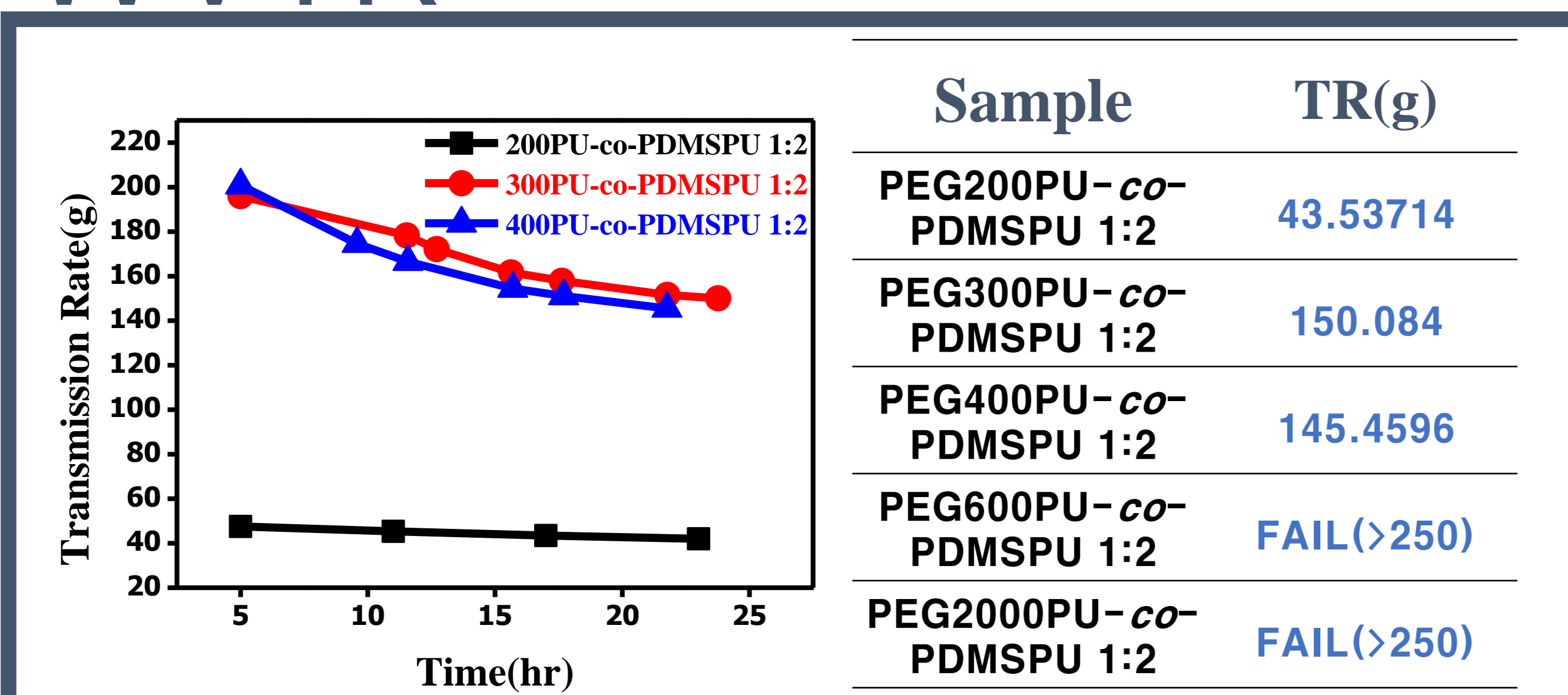
GPC



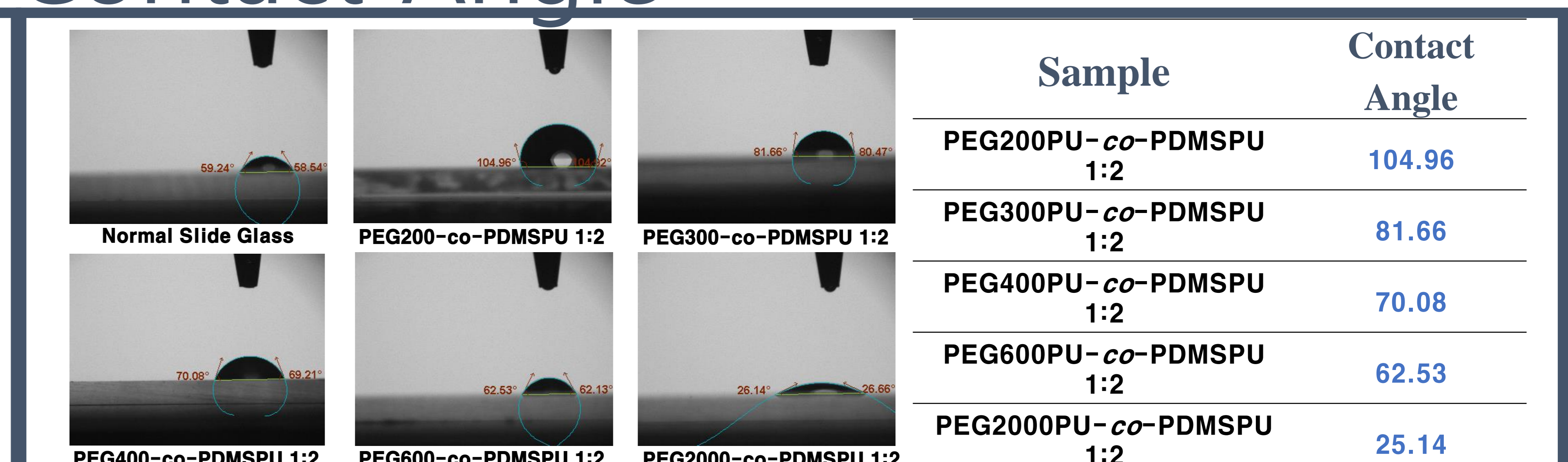
UTM



WVTR



Contact Angle



Conclusion

1. The successful synthesis of PEG-PDMS-PU using both PEG and PDMS blocks as soft segments
2. The good water barrier property of PEG200-PDMS-PU due to flat molecular packing structure
3. The high contact angle caused rich hydrophobic phase by many urethane groups.
4. The high Young's modulus of PEG200-PDMS-PU due to the strong H-bonding

Acknowledgment

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