

Effect of blending silicone acrylates and Acrylic monomers in acrylic polymers with high transparency, water resistance for protecting phosphorescent material.

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Abstract

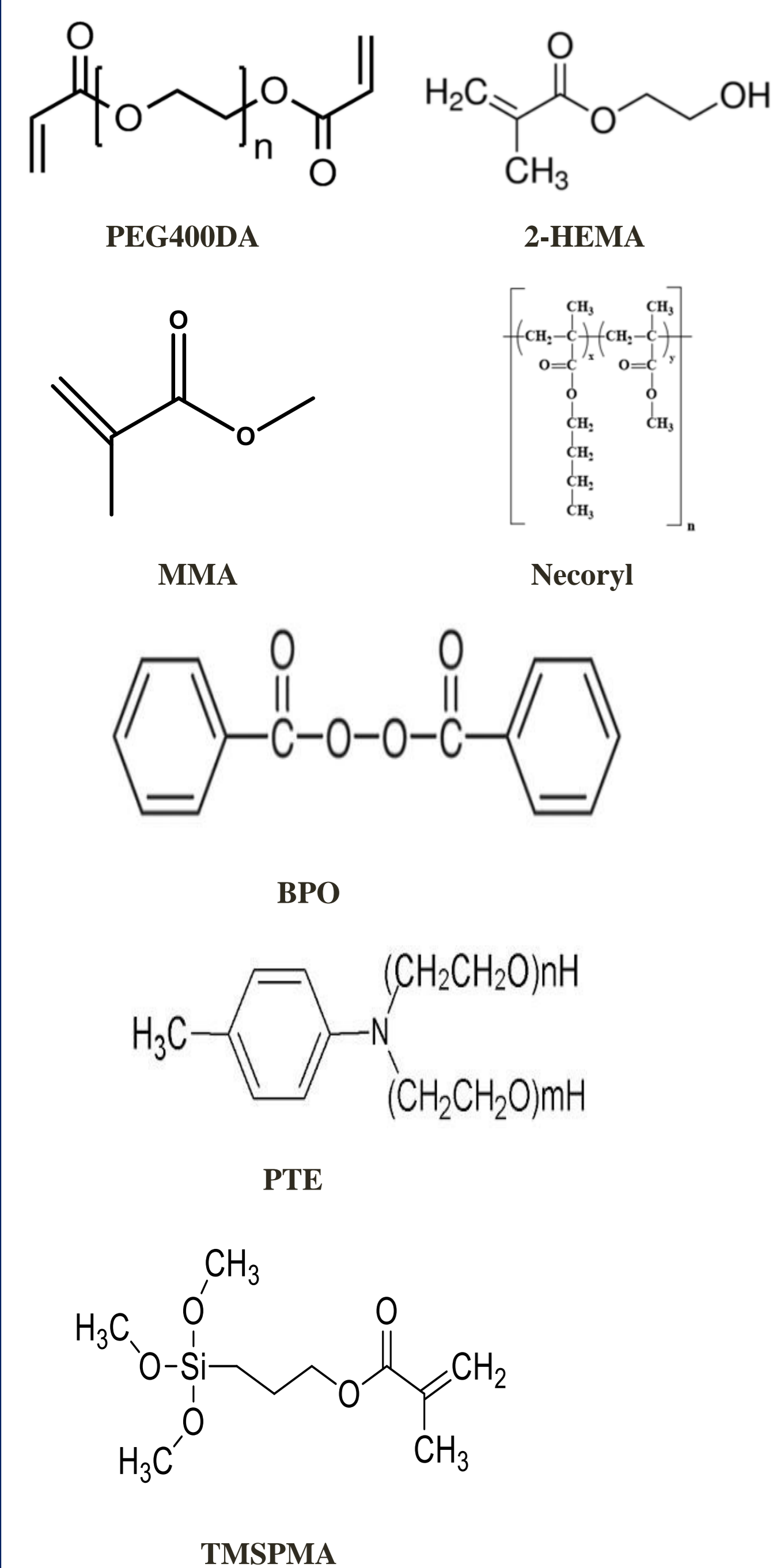
Acrylic polymer binder are being applied to road sign binder to meet high transparency and tensile strength. Since acrylic binder lacks of water resistance, it tries to increase water resistance for protecting phosphorescent materials in binder. In this study, using various acrylic monomer species and acrylates (2-HEMA, MMA), silicone acrylates and Initiator(BPO) with Nitrogen catalyst (PTE) was mixed by changing the ratio of acrylates and silicone acrylates. Mechanical properties, transmittance, contact angle were reviewed by Universal Test Machine (UTM), UV-Visible Spectrophotometer (UV) and Contact Angle Meter. Also, Polymerization of the binder and samples were confirmed by Fourier Transform Infrared Spectrometer (FT-IR).

Objective

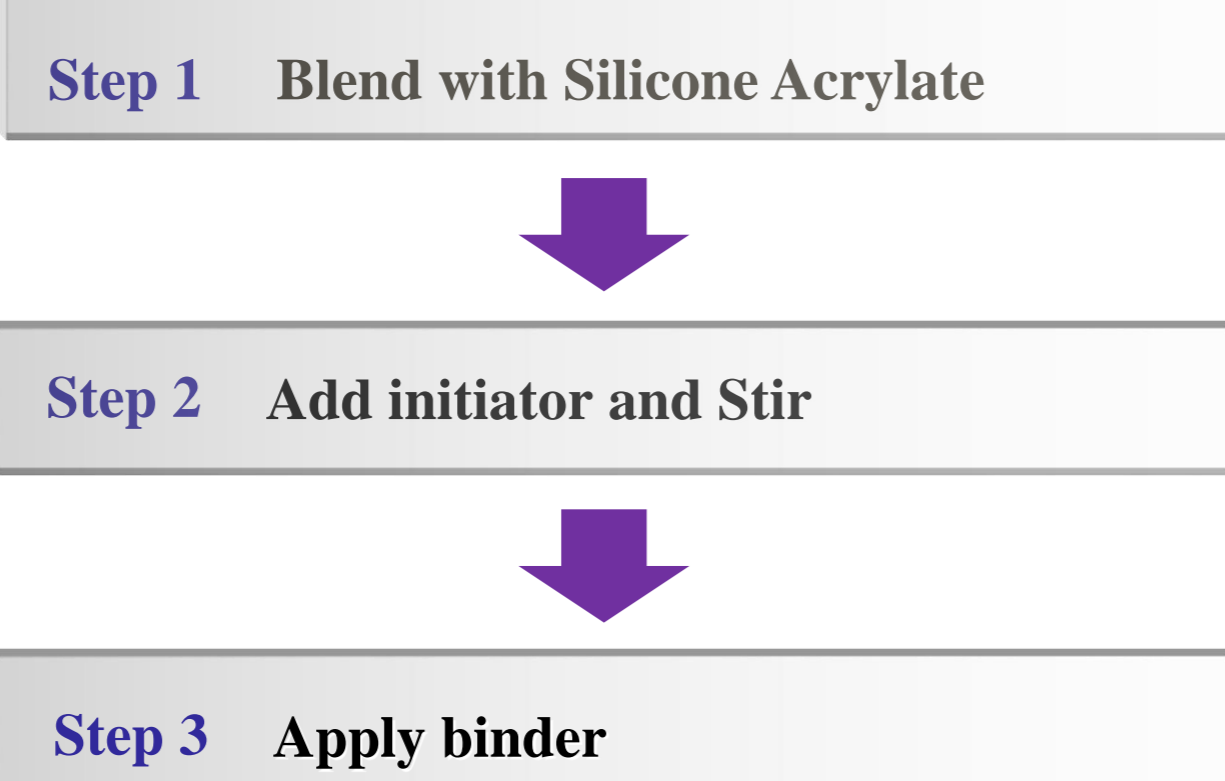
According to monomer contents

1. Characteristics comparison of optical properties
2. Characteristics comparison of adhesive strength
3. Characteristics comparison of hydrophobicity

Materials



Experimental

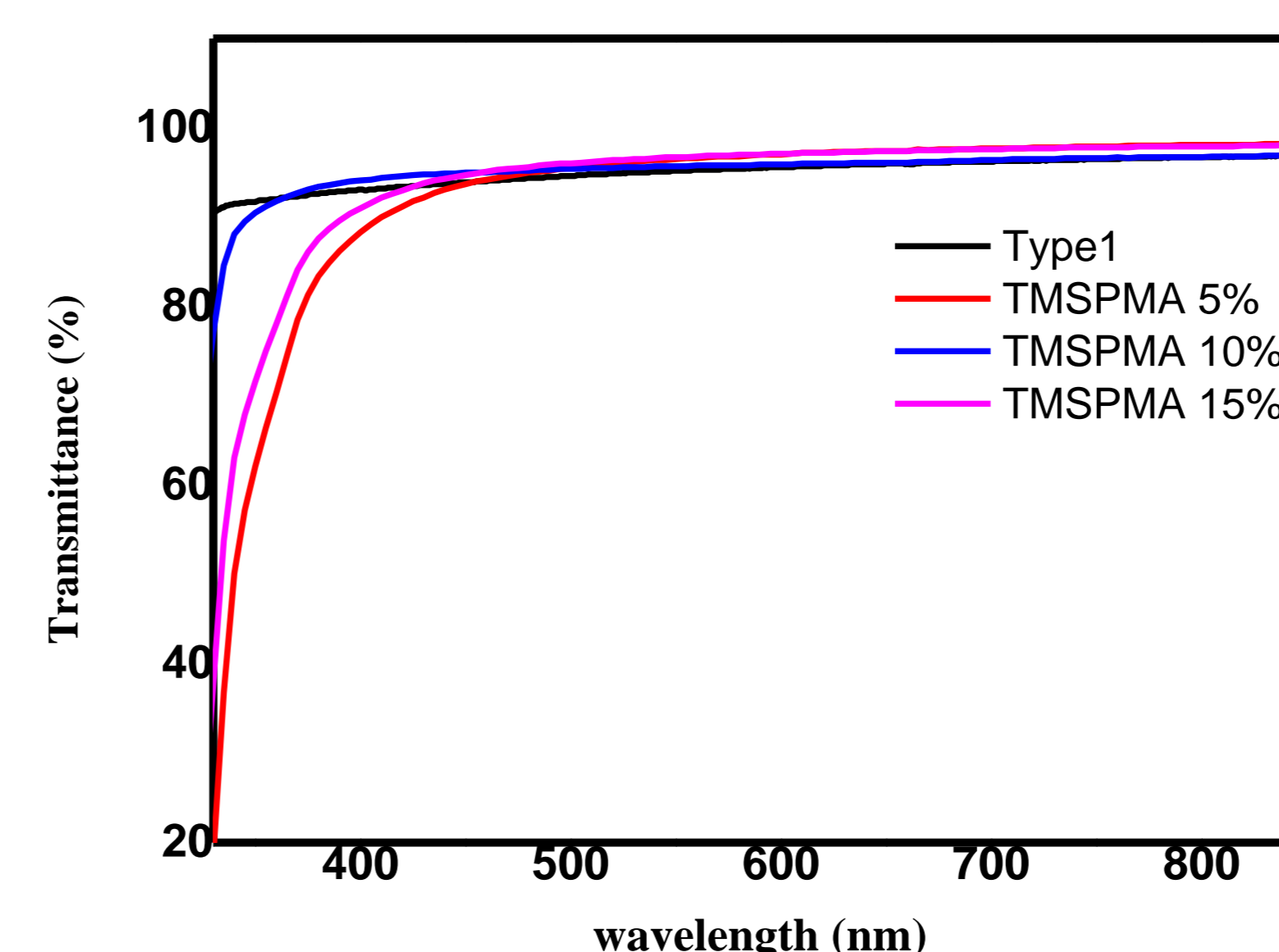


Contents table

SAMPLE	Ref (wt%)	Sample (wt%)
Reference	1	0
TMSPMA 5%	0.95	0.05
TMSPMA 10%	0.9	0.1
TMSPMA 15%	0.85	0.15

Results

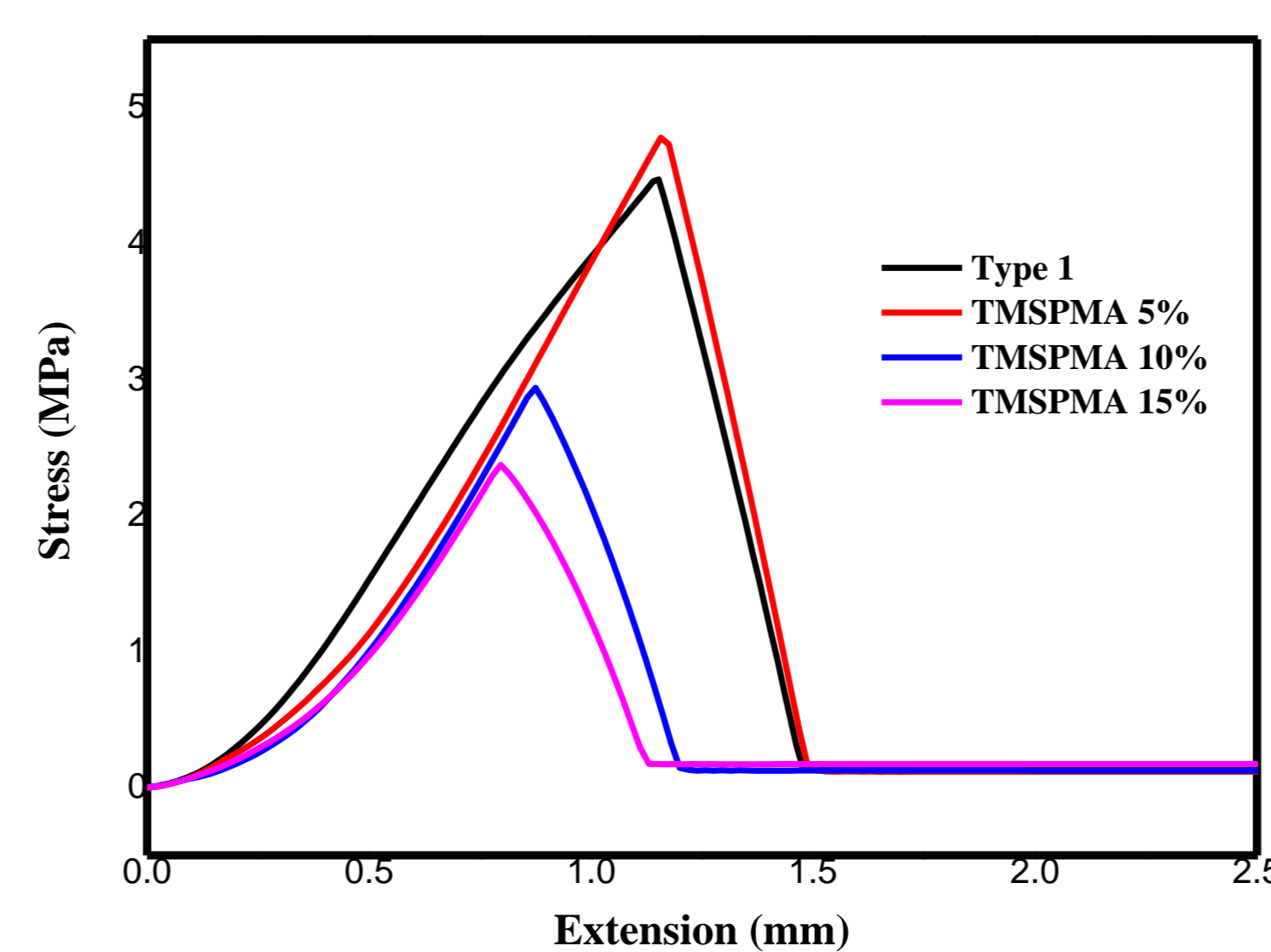
Transmittance



Transmittance at 530nm

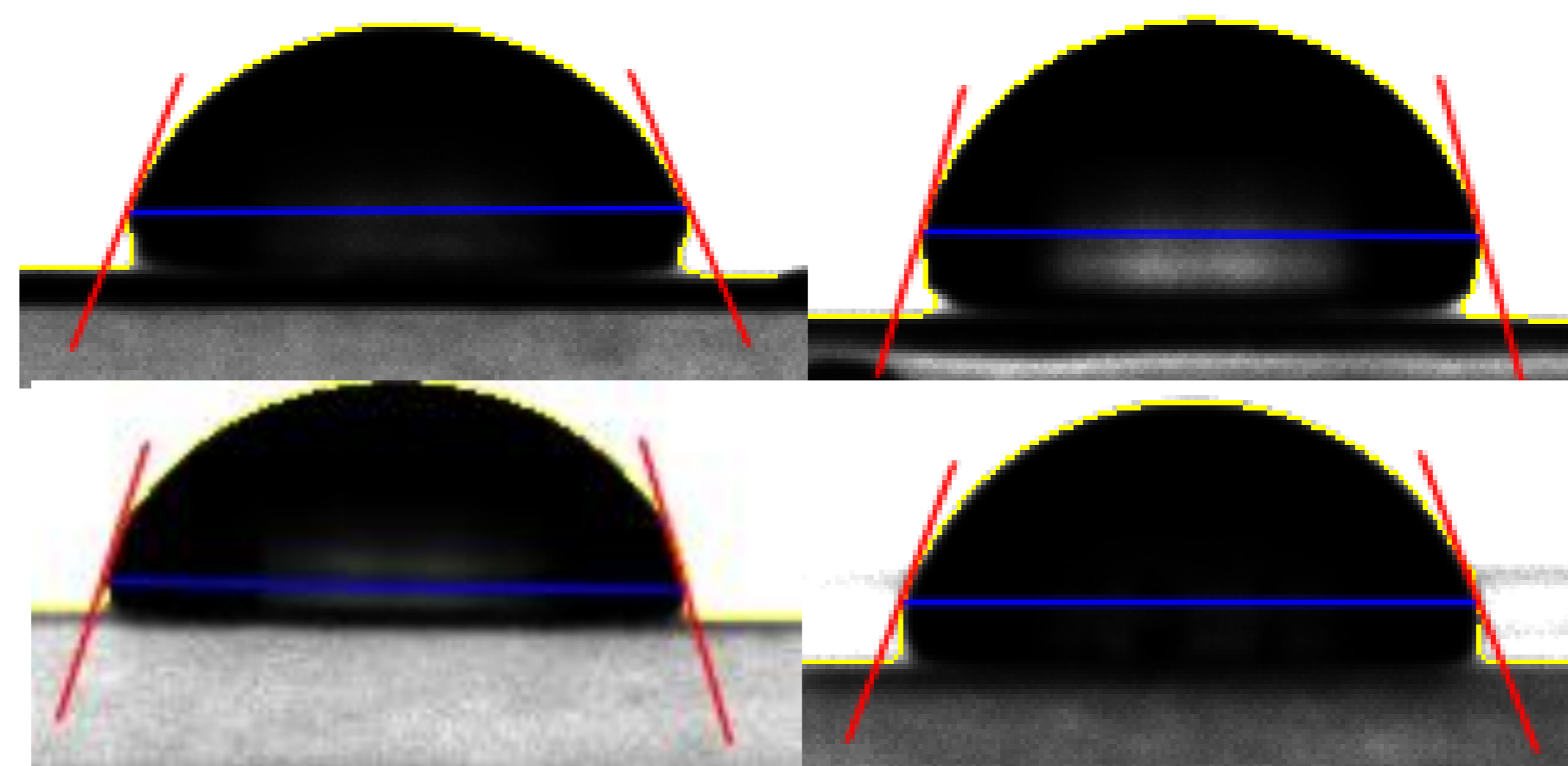
SAMPLE	Transmittance
Reference	91.4
TMSPMA 5%	91.9
TMSPMA 10%	95.7
TMSPMA 15%	97.8

UTM



SAMPLE	Peak strength
Reference	4.223
TMSPMA 5%	4.78
TMSPMA 10%	2.94
TMSPMA 15%	2.37

Contact angle



SAMPLE	Contact Angle
Reference	68.92
TMSPMA 5%	73.73
TMSPMA 10%	75.85
TMSPMA 15%	76.7

Conclusion

- Polymerization was confirmed by decreasing the peak of C=C at 1640 cm⁻¹ according to radical reaction through FT-IR
- Transmittance increases as the content of TMSPMA increases.
- Contact angle increases to 10 % of TMSPMA content, and the contact angle decreases from 10 % of TMSPMA content.
- Peak strength decrease to 10 % of TMSPMA content, and the peak strength increases from 10 % of TMSPMA content.
- As Wettability increases, Adhesion Strength increases. Proper content is important.

Acknowledgement

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