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광자극 감응형 아크릴-실란 고분자 바인더의 특성 향상

Improvement of properties of photostimulation-sensitive acrylic-silane polymer binder

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Abstract

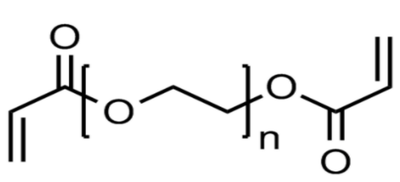
광자극 감응형 소재는 도로교통 분야에서 스마트 소재를 활용하여 안전한 주행환경을 구현할 수있는 지능형 도로에 대한 기술이자, 실시간 도로 정보시각화를 통한 사고 위험 예방 및 취약구간에서 도로 이용자의 시선유도를 통해 보다 안전한 주행 여건을 제공하기 위해 매력적인 연구분야로 여겨진다. 우리는 광자극 감응형 소재 물성 향상을 위해 아크릴 고분자의 무황변, 고투명성, 내수성 복합화 바인더 기술을 연구하였다. 아크릴 고분자 바인더는 polyethylene glycol 400 diacrylate, methylmethacrylate, 2-Hydroxyethyl methacrylate, Neocryl, benzoylperoxide(BPO), N,N-Bis(2-hydroxyethyl)-paratoluidine(Bisomer PTE) 및 Silane을 다양한 비율로 배치과정을 통해 합성하였다. 만들어진 고분자 바인더는 우수한 투명성과 접착특성을 가지며 내수성이 향상 된 것을 확인할 수 있었다. 접착강도는 Universal test machine(UTM)을 통해 확인할 수 있었고, 투과도와 내수성은 각각 UV-visible spectrophotometer, contact angle meter 기기를 통해 분석 및 연구를 진행하였다.

Objective

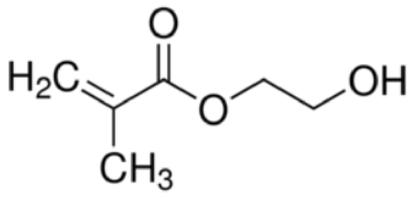
According to monomer contents

1. **Characteristics comparison of optical properties**
2. **Characteristics comparison of adhesive strength**
3. **Characteristics comparison of wettability**

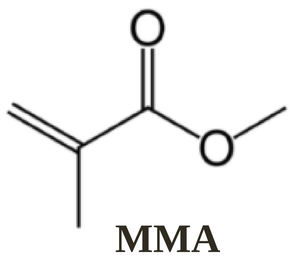
Experimental



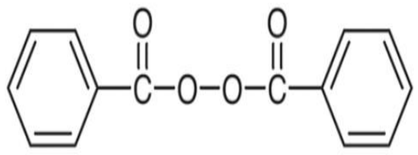
PEG400DA



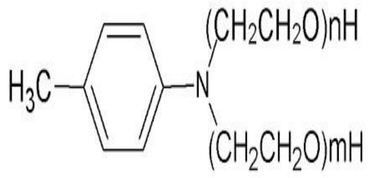
2-HEMA



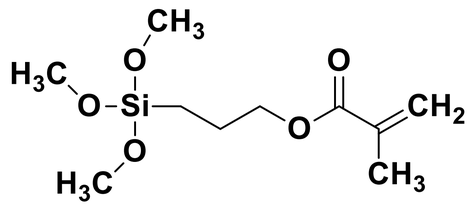
MMA



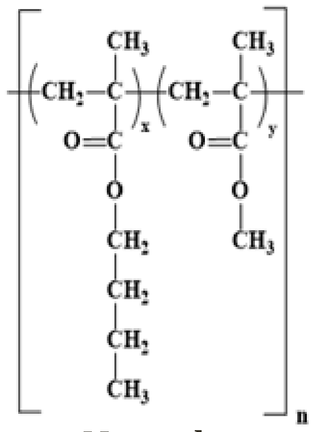
BPO



PTE



TMSPMA



Necoryl

Experimental

Step 1 Blend Acrylic monomer and catalyst

Step 2 Add initiator and Stir

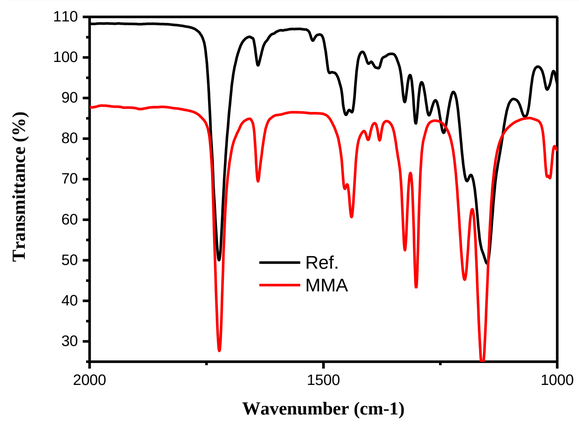
Step 3 Apply adhesive to specimen

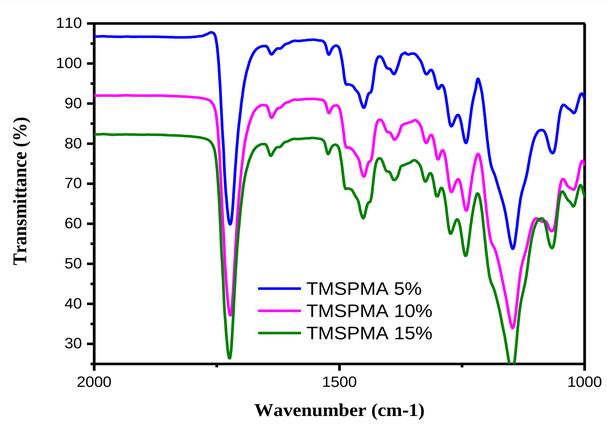
Contents table

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

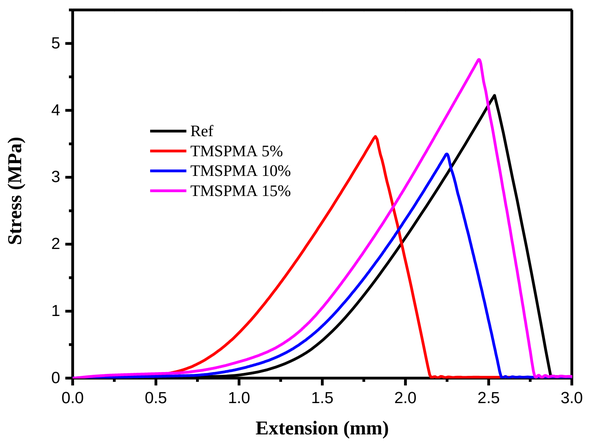
Results

FT-IR



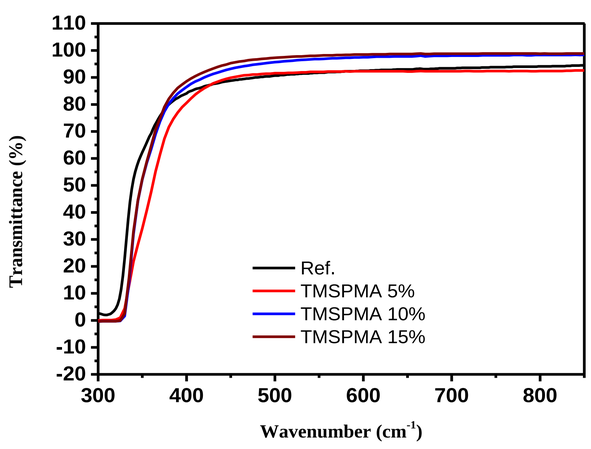


UTM



SAMPLE	Peak strength
Reference	4.223
TMSPMA 5%	3.61
TMSPMA 10%	3.34
TMSPMA 15%	4.75

Transmittance



SAMPLE	Peak strength
Reference	4.223
TMSPMA 5%	3.61
TMSPMA 10%	3.34
TMSPMA 15%	4.75

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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