Modification of castor oil-based waterborne polyurethane with polyhydroxy sapium sebiferum oil as crosslinking agent

Bin Lyu[1, 2, 3*], Henian Zhang[1, 2, 3], Dangge Gao[1, 2, 3], Peng Chen[1, 2, 3], Jianzhong Ma[1, 2, 3]

（1. College of Bioresources Chemical and Materials Engineering,
Shaanxi University of Science & Technology, Xi'an 710021, China.
2.National Demonstration Center for Experimental Light Chemistry Engineering Education, Xi'an 710021, Shaanxi, China.
3.Xi'an Key Laboratory of Green Chemicals and Functional Materials.Xi'an 710021, China.）

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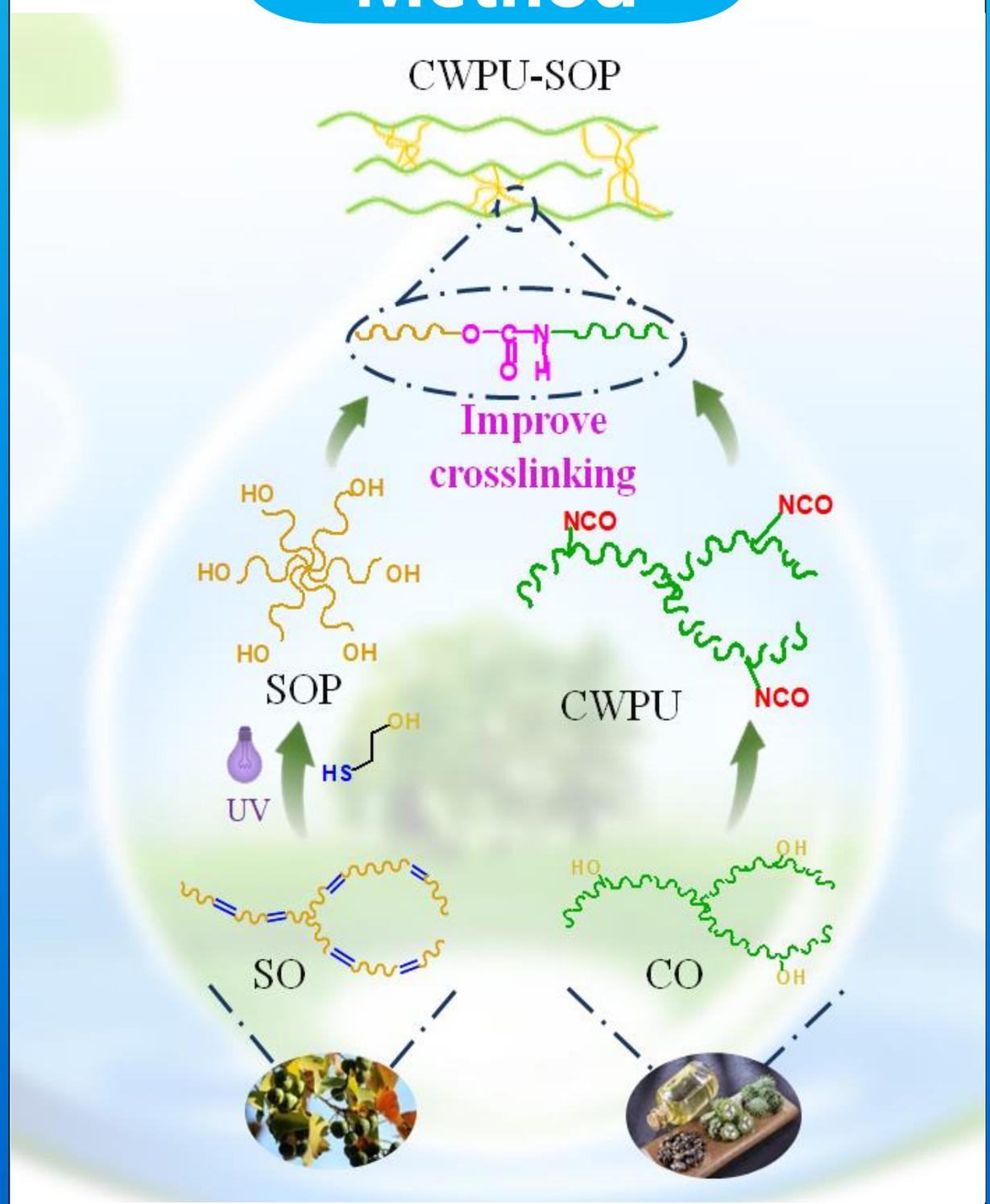
introduction

Polyurethane as a leather finishing agent is polluted during the production process. Castor oil-based waterborne polyurethane (CWPU) can be prepared from castor oil as raw material, but the low cross-linking effects the performance of CWPU. In this study, sapium sebiferum oil with high iodine value was modified with mercaptoethanol through the thiol-ene photo-click reaction, and the sapium sebiferum oil-based polyol (SOP) was prepared to improve the crosslinking of CWPU, which can promote the hydrophobicity, thermal stability and anti-graffiti property of CWPU.

Method



Scheme 1. Synthetic route of CWPU-SOP

Results

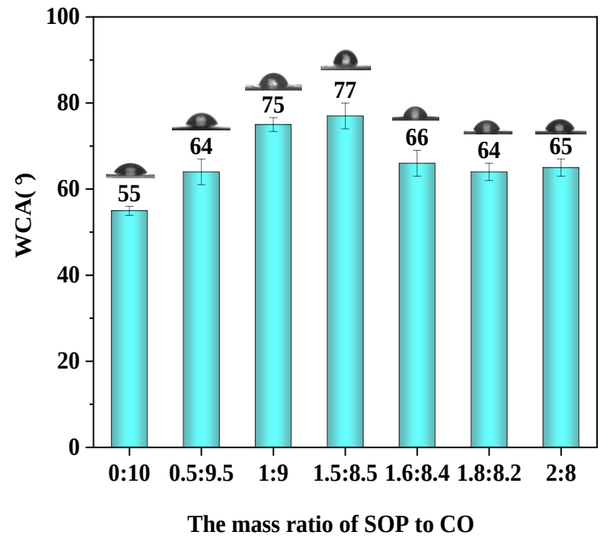


Figure 1. The WCA of CWPU-SOP films based on different mass ratio of SOP to CO

Figure 2. anti-graffiti property of (a, b)CWPU and (c, d)CWPU-SOP

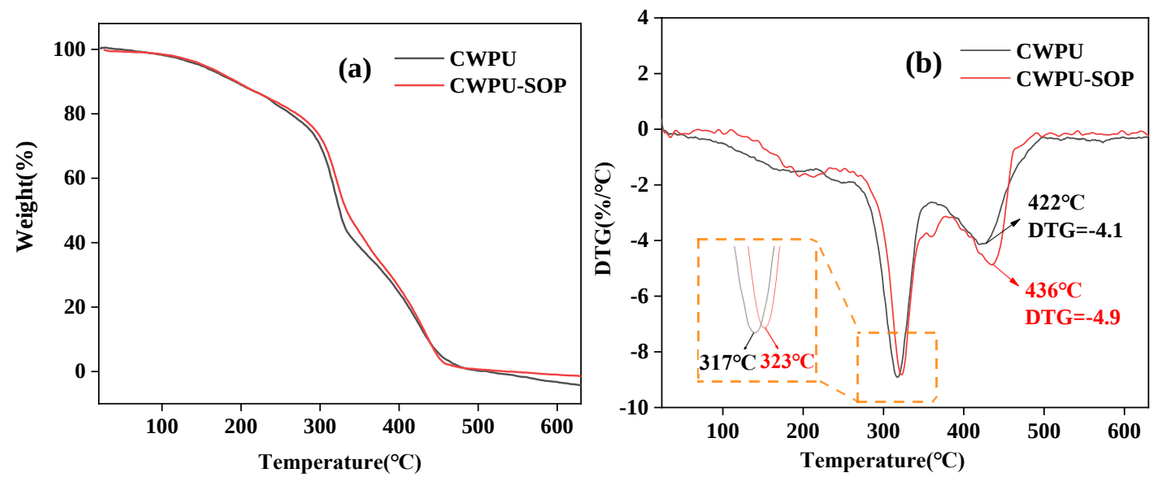


Figure 3. TGA curves (a) and their derivative curves (b) for CWPU and CWPU-SOP.

Table 1. The tensile strength and elongation at break of CWPU-SOPs from different mass ratio of SOP to CO

the mass ratio of SOP to CO	CWPU	0.5:9.5	1.0:9.0	1.5:8.5	1.6:8.4	1.8:8.2	2.0:8.0
tensile strength (MPa)	0.78	0.62	0.45	0.87	1.08	1.30	1.70
elongation at break(%)	60	55	78	138	157	170	170

Conclusions

It was found that, when the mass ratio of SOP to CO was 2:8, the water resistance of the blend films increased correspondingly with well anti-graffiti performance, and the tensile strength, elongation at break can be 1.7Mpa and 170%, respectively. For CWPU-SOP, the temperature of maximum rate of weight loss can be inproved by 10℃ than CWPU.

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