

Waterborne Polyurethane from CO₂ Based Polyol with Comprehensive Hydrolysis/oxidation Resistance

Jin Wang ^{ab}, Hongming Zhang^{*a}, Yuyang Miao ^a, Lijun Qiao ^a, Xianhong Wang^{*a}, and Fosong Wang ^a

^aKey Laboratory of Polymer Eco-materials, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun 130022, People's Republic of China. Corresponding authors: E-mail: xhwang@ciac.ac.cn or hmzhang@ciac.ac.cn; Fax: +86 431 85689095; Tel: +86 431 85262250

^bUniversity of Chinese Academy of Sciences, Beijing 100039, People's Republic of China

Supplementary information

1) Contact angle

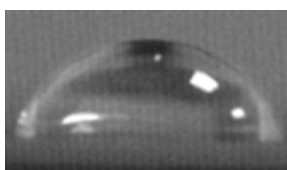
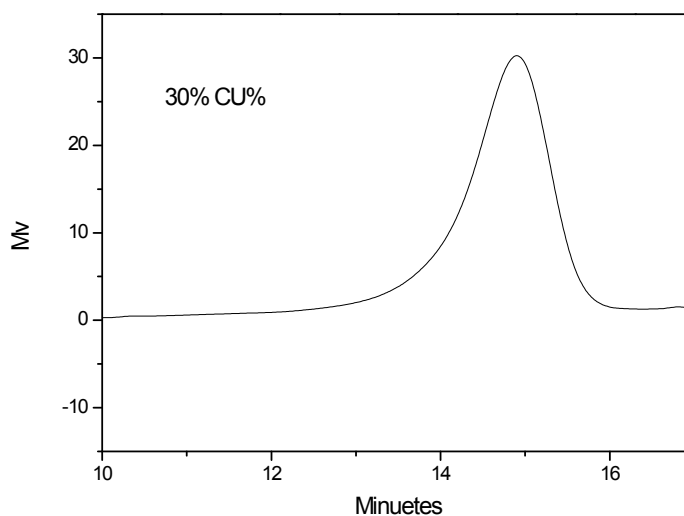
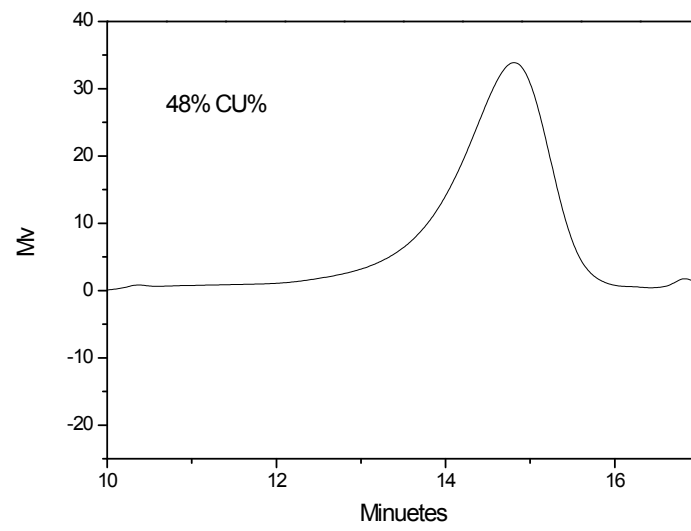
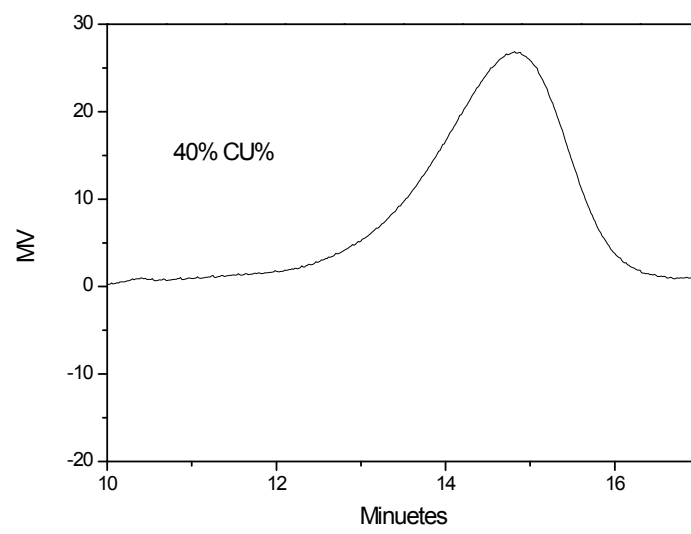


Fig. 1 Contact angle of CO₂-WPU dispersion.

2) GPC spectral of CO₂-polyol





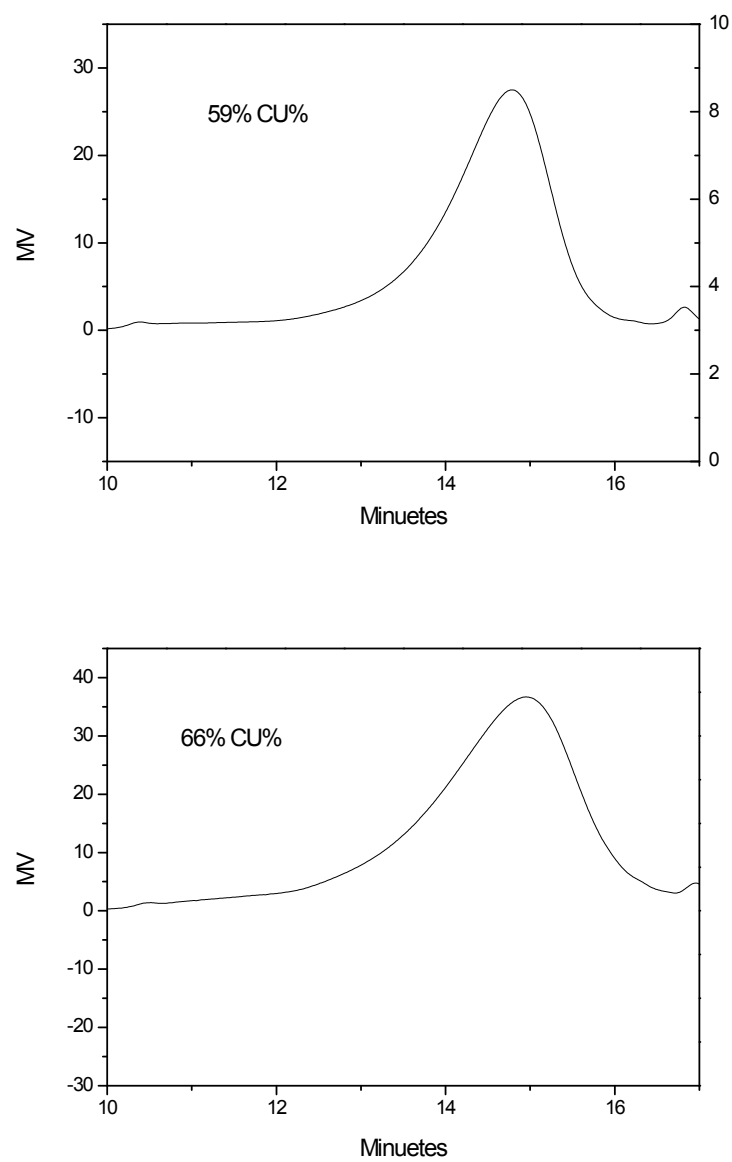


Fig. 2 GPC spectral of CO₂-polyol with CU% to be 30%, 40%, 48%, 59% and 66%.

3) ¹H-NMR spectral

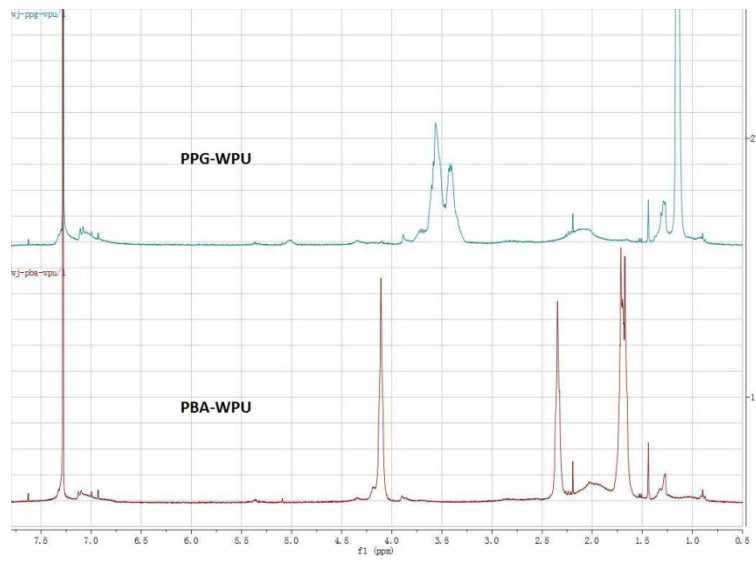


Fig. 3a ^1H -NMR spectral of PBA-WPU and PPG-WPU

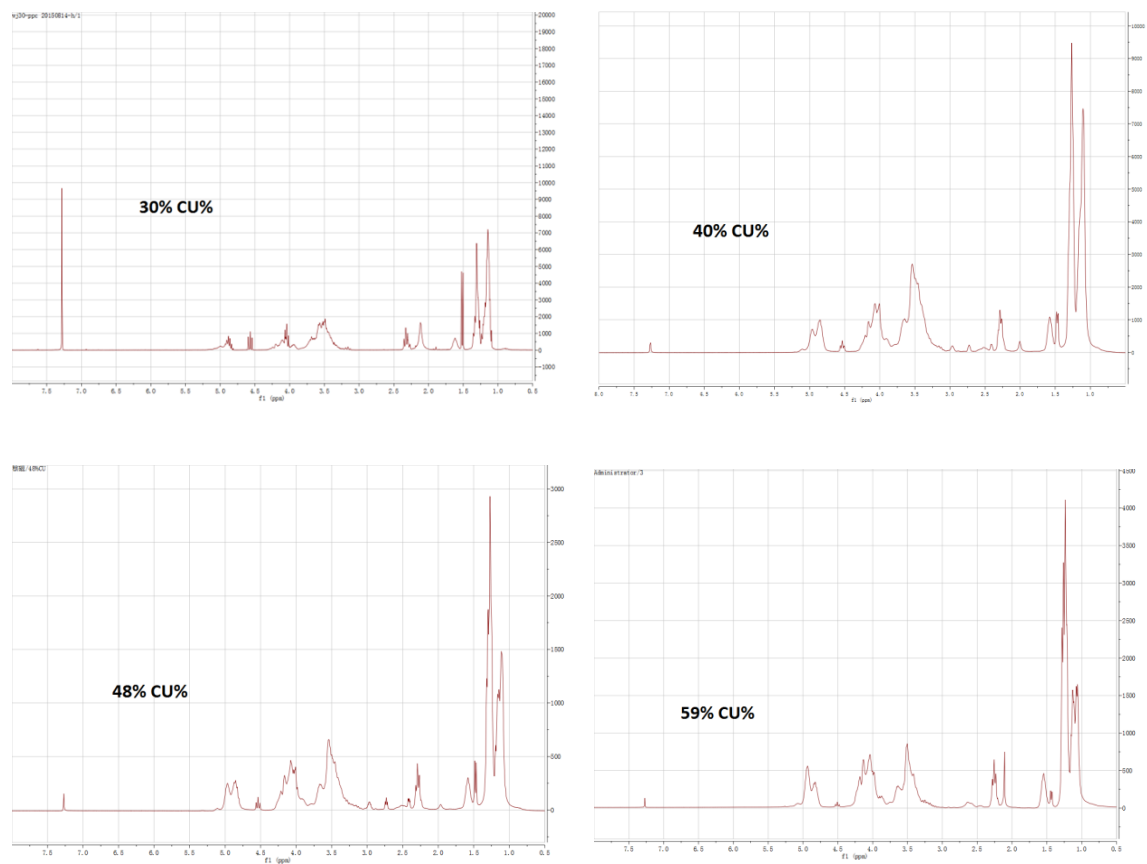


Fig. 3b ^1H -NMR spectral of CO_2 -polyol with variety in CU%

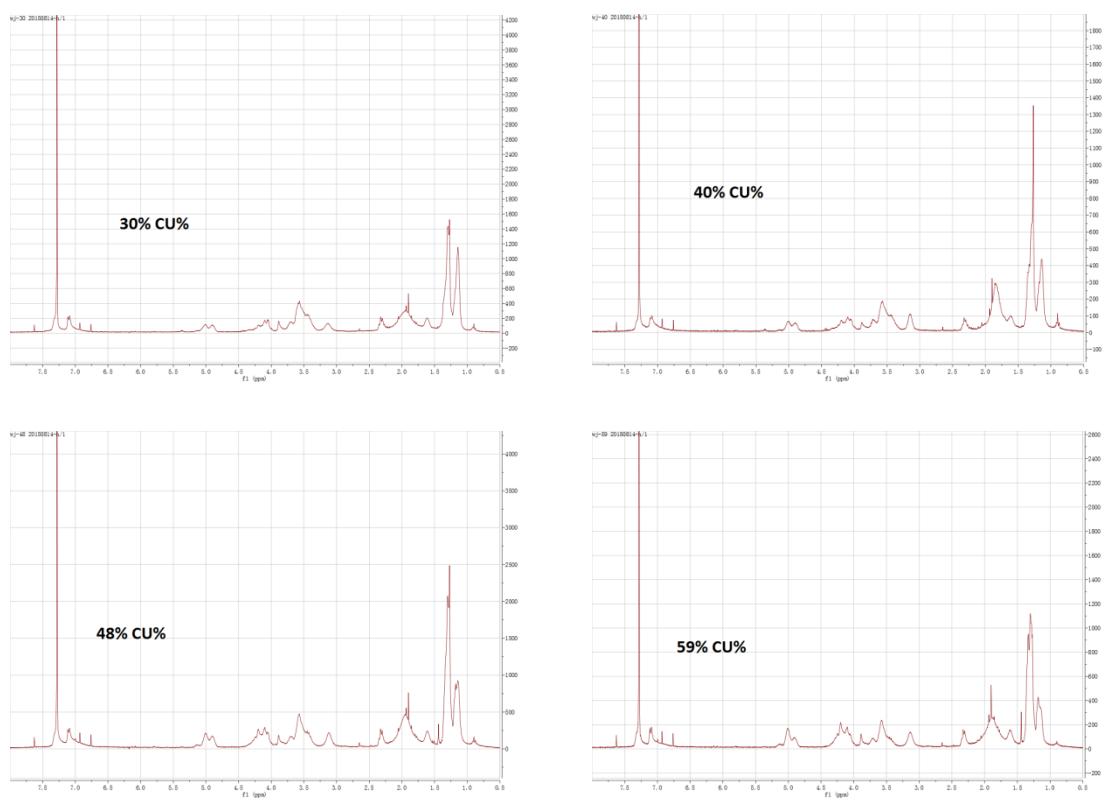


Fig. 3c ^1H -NMR spectral of CO_2 -WPU with variety in CU%

4) FT-IR spectral of PBA-WPU and PPG-WPU

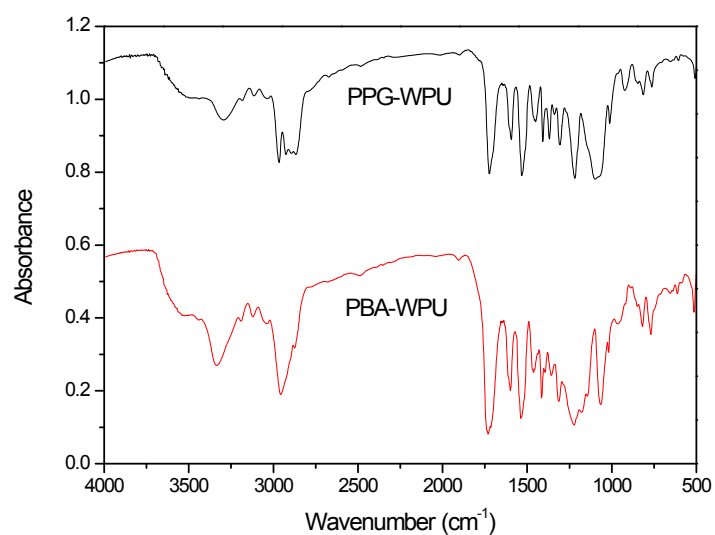


Fig . 4 FT-IR spectral of PBA-WPU and PPG-WPU.

5) Thermostability analysis

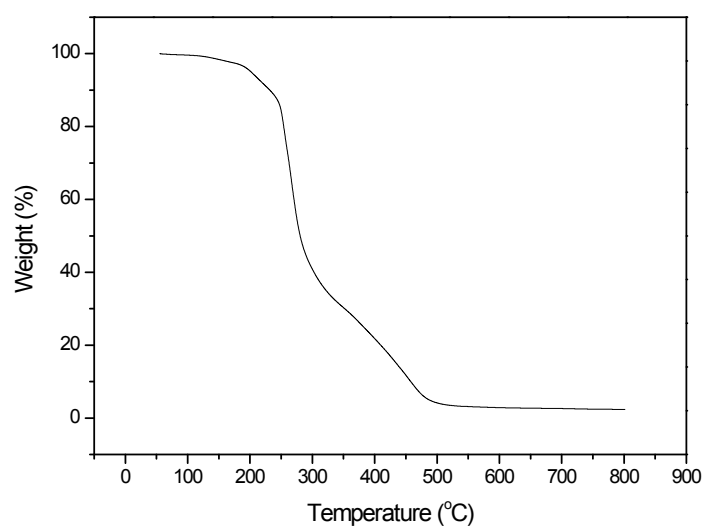


Fig. 5 TGA spectral of CO₂-WPU.

6) Pictures of hydrolysis/oxidation resistance procedure



Fig .6a The alkaline resistance of various WPU, the photos of group 1, 2, 3 correspond to the beginning of immersing, after 300 min and 520 min immersion, respectively. In each group, the left, middle, and right photos correspond to CO₂-WPU, PBA-WPU and PPG-WPU, respectively.

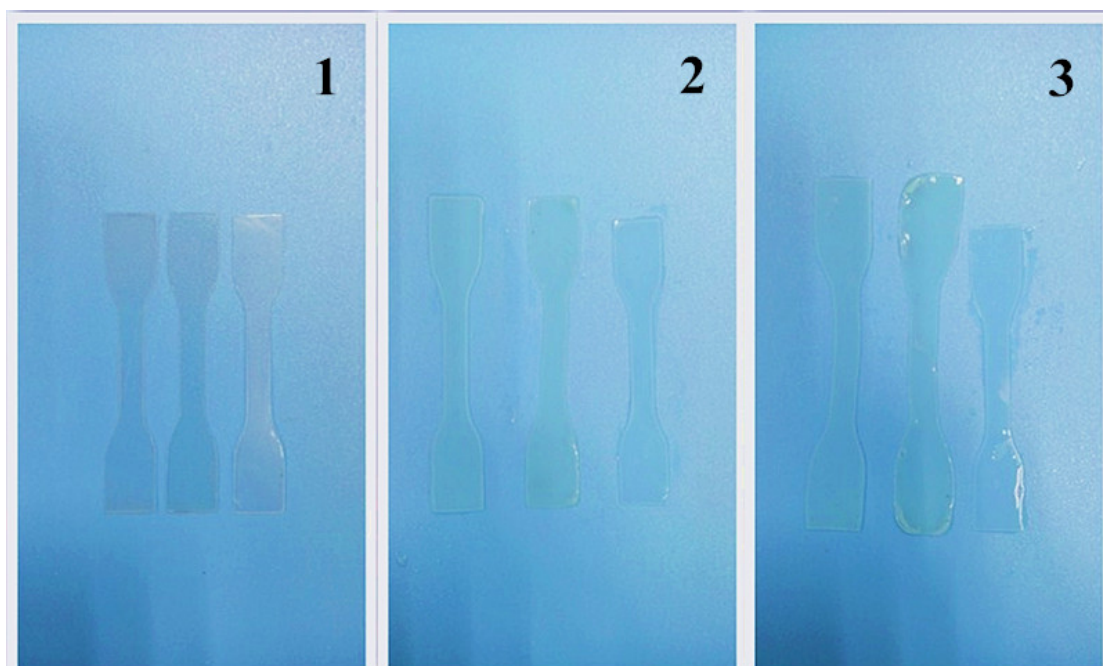


Fig .6b The swelling resistance of various WPU, the photos of group 1, 2, 3 correspond to the beginning of immersing, after 90 min and 180 min immersion, respectively. In each group, the left, middle, and right photos correspond to PPG-WPU, PBA-WPU and CO₂-WPU, respectively.

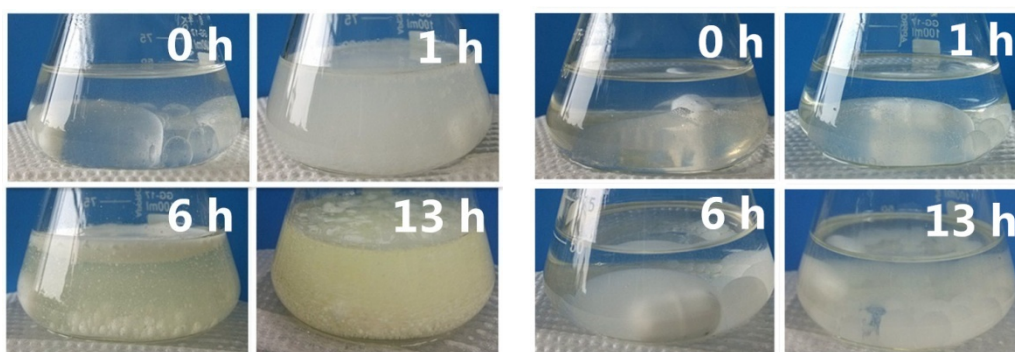
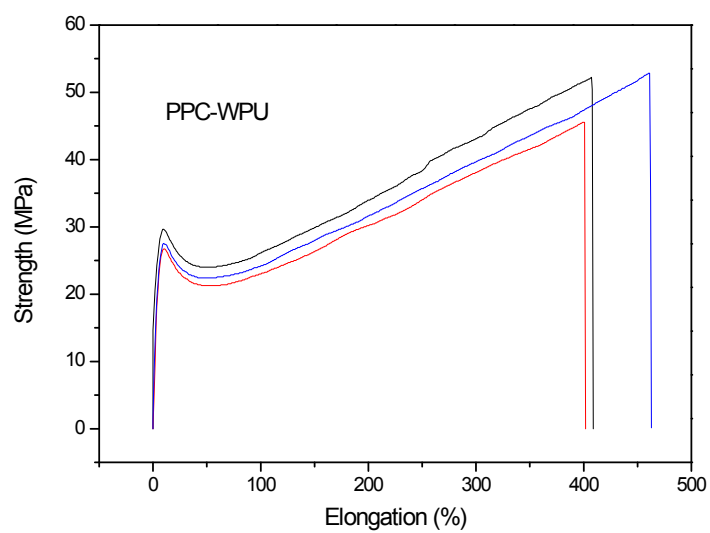
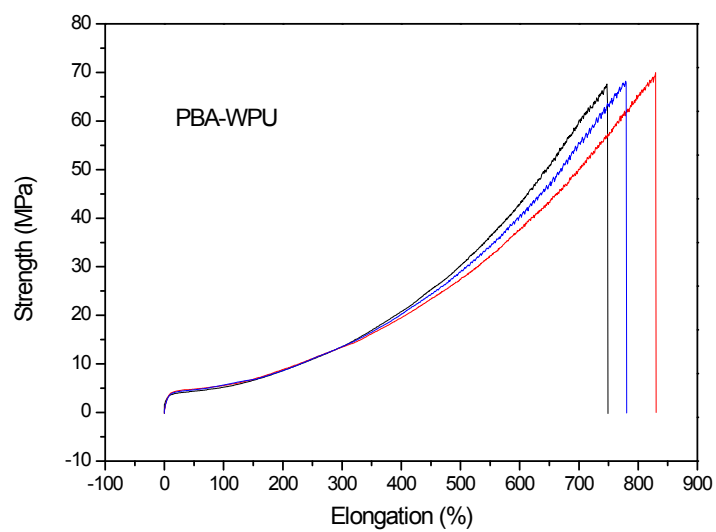


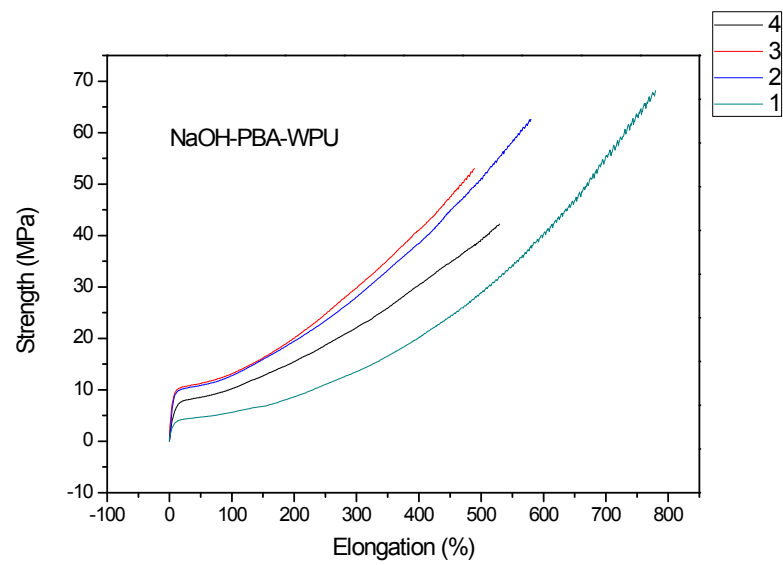
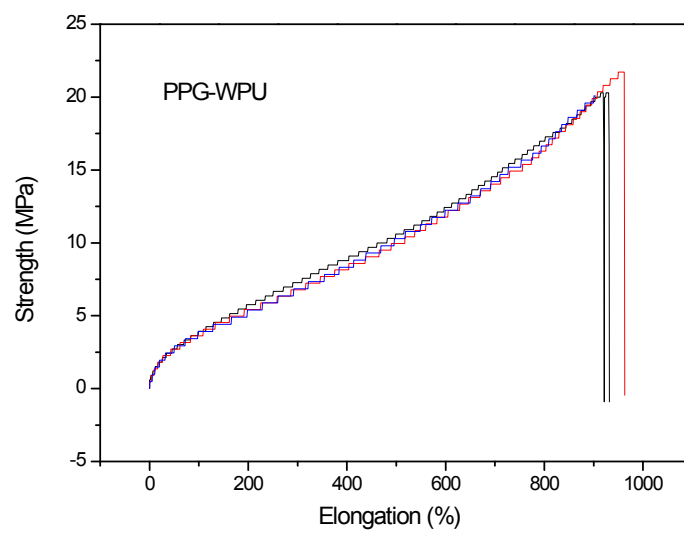
Fig. 6c Photos of immersion of PBA and CO₂-polyol in 10% NaOH, respectively. Left photos were the change of PBA with different immersion time, right photos were the results of CO₂-polyol with different immersion time.

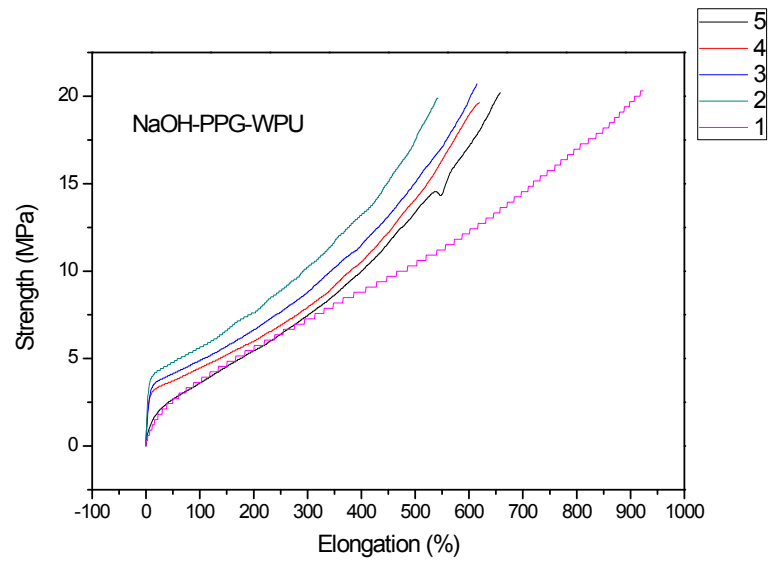
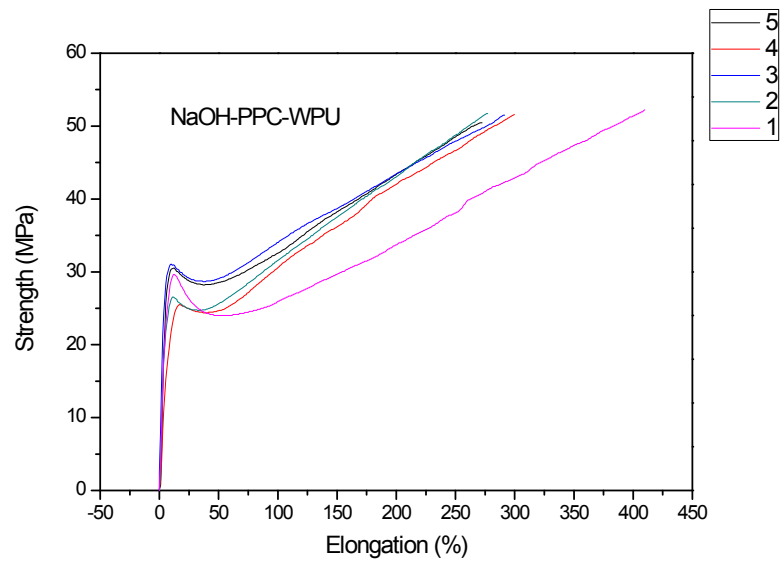


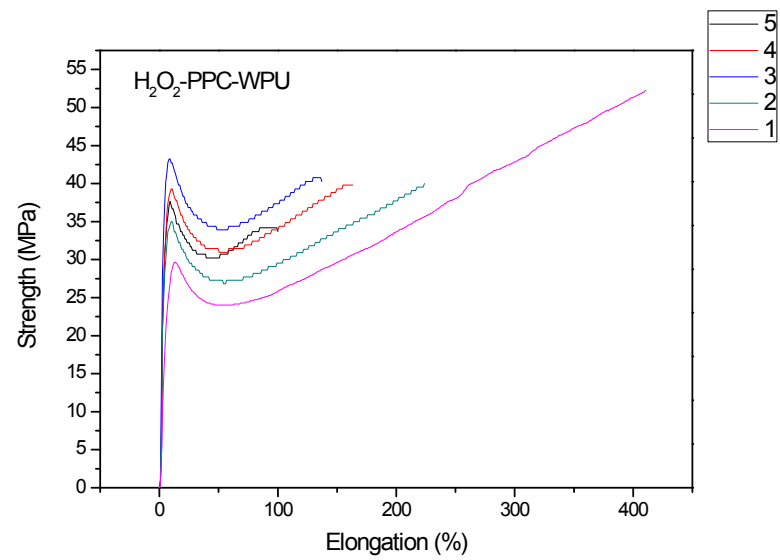
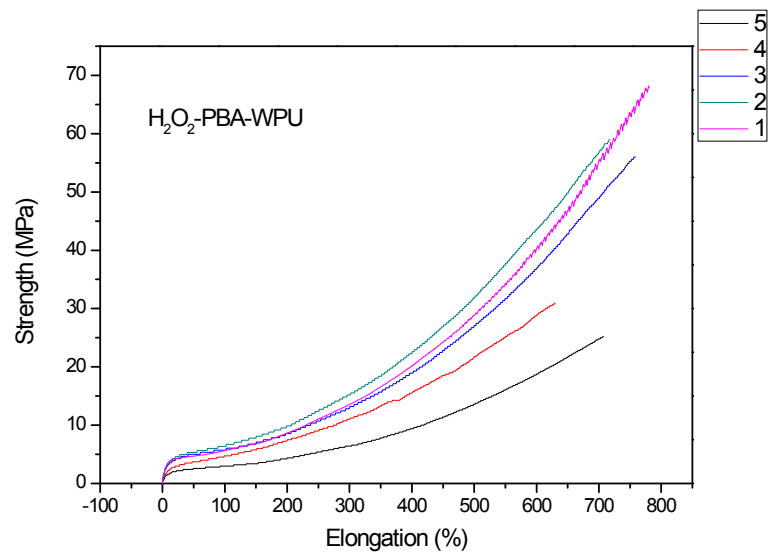
Fig .6d The oxidation resistance of various WPU, the photos of group 1, 2, 3 correspond to the beginning of immersing, after 5 h and 20 h immersion, respectively. In each group, the left, middle, and right photos correspond to CO₂-WPU, PBA-WPU and PPG-WPU, respectively.

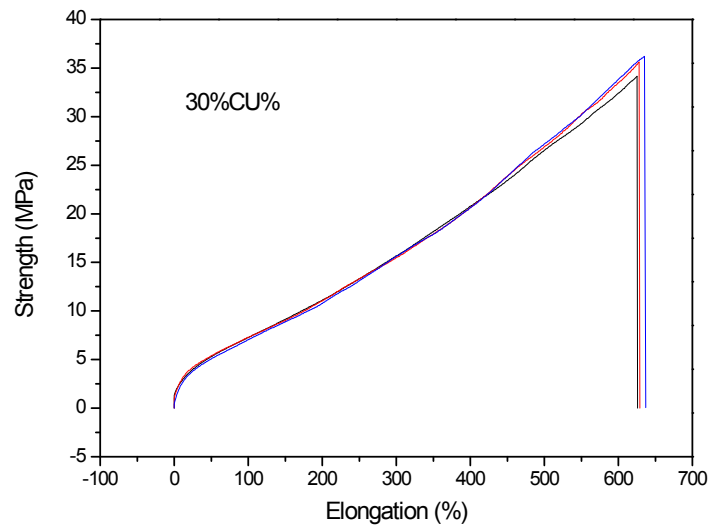
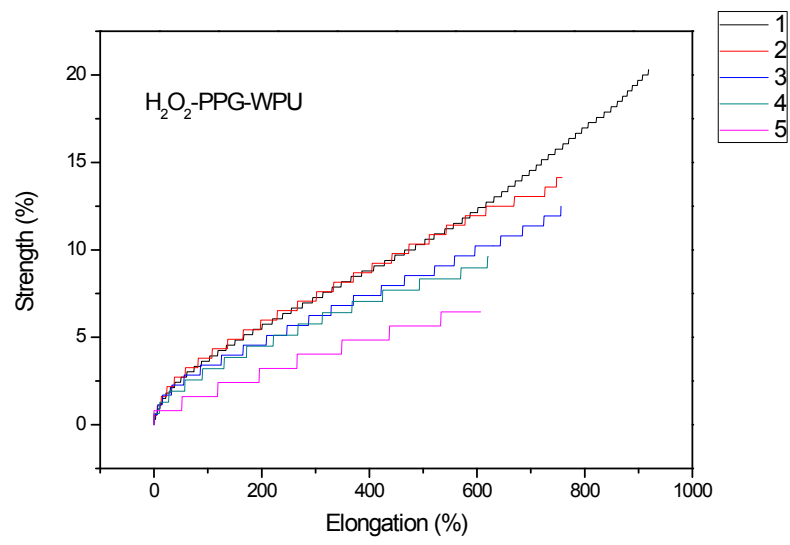
7) Tensile Stress-strain curves

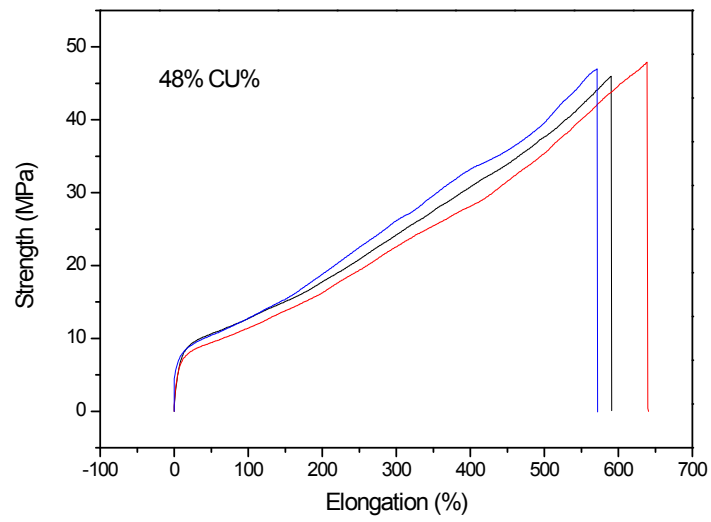
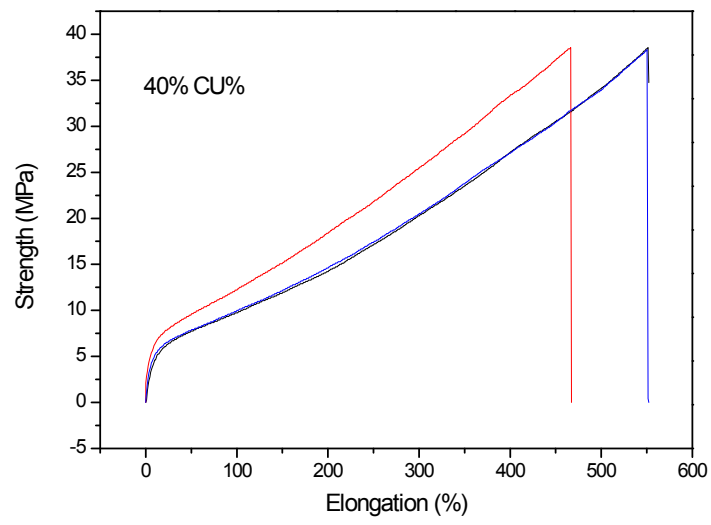












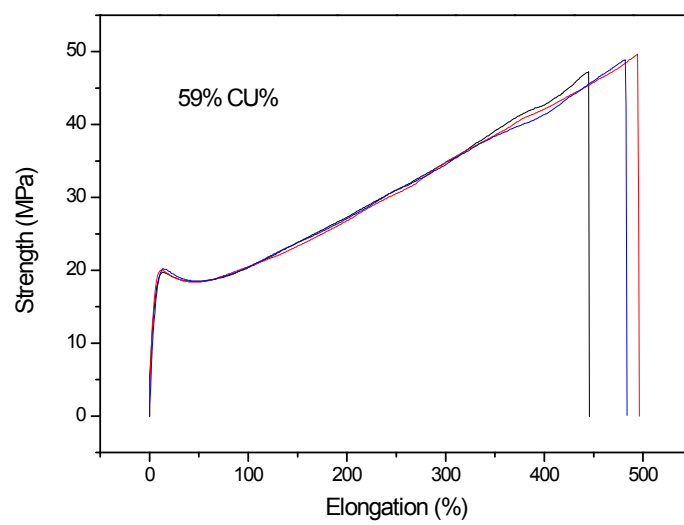


Fig . 7 Tensile Stress-strain curves of related films.