Supporting information

Self cross-linkable anionic waterborne polyurethane-silanol dispersions from cottonseed oil-based phosphorylated polyol as ionic soft segment

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Figure S4. FT-IR spectra of **(a)** ECSO and Phospol ; **(b)** phospol-P5, P10, and P15.

Figure S5. ^{1}H NMR spectra of ECSO and Phospol.

Figure S6. ^{31}P NMR spectra of phospols.

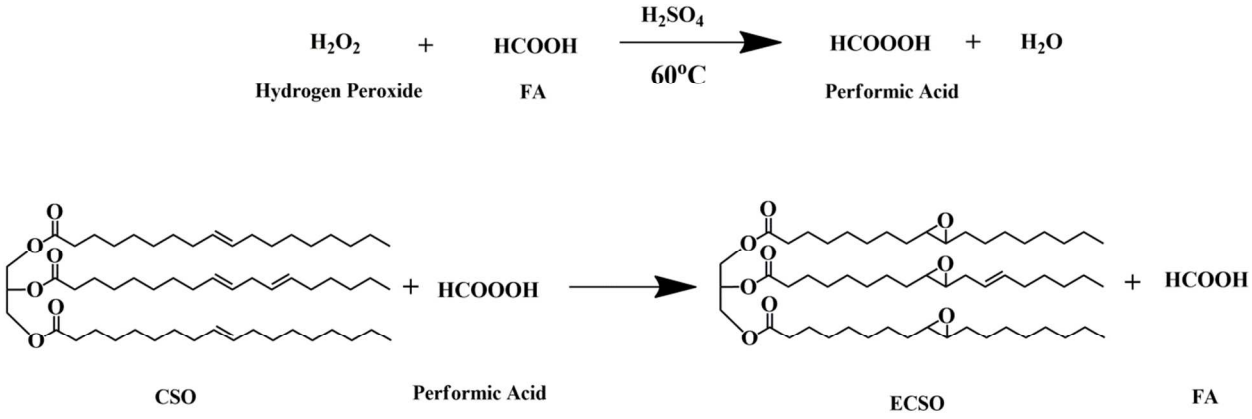
Figure S7. Particle size distribution of phospol based PU dispersion.

Figure S8. DSC scans of phospol PUD films

Figure S9. TGA curves of phospol PUD films.

Synthesis of the Epoxidized Cottonseed oil (ECSO)

The reaction takes place in a three necked flask equipped with mechanical stirrer, dropping funnel, and thermometer. Cottonseed oil charged into the reaction flask, mixed with formic acid(the molar ratio of the oil unsaturation & FA is 1:0.5) and sulfuric acid (2 wt% of HCOOH & H_2O_2) at 10 °C for 30 minutes. Then solution of 30% H_2O_2 (the molar ratio between the oil unsaturation and H_2O_2 is 1:1.2) was added drop wise to the mixture under vigorous stirring for a period of 30 minutes. Once, the completion of H_2O_2 addition, the reaction was continued for another 5h at 60 °C. At the end, the product mixture was extracted by ethyl acetate, and washed with deionized water and brine. The organic phase was dried over anhydrous Na_2SO_4, filtered and concentrated in vacuum to yield the product ECSO as yellow liquid.



Scheme S1. Synthesis of epoxy cotton seed oil (ECSO)

Additional figures

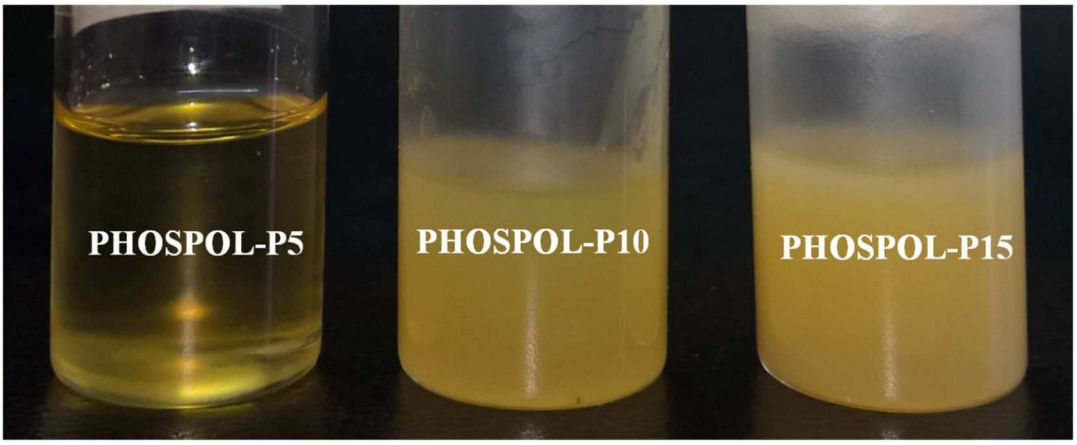


Figure S1. Visual appearance of phospols.

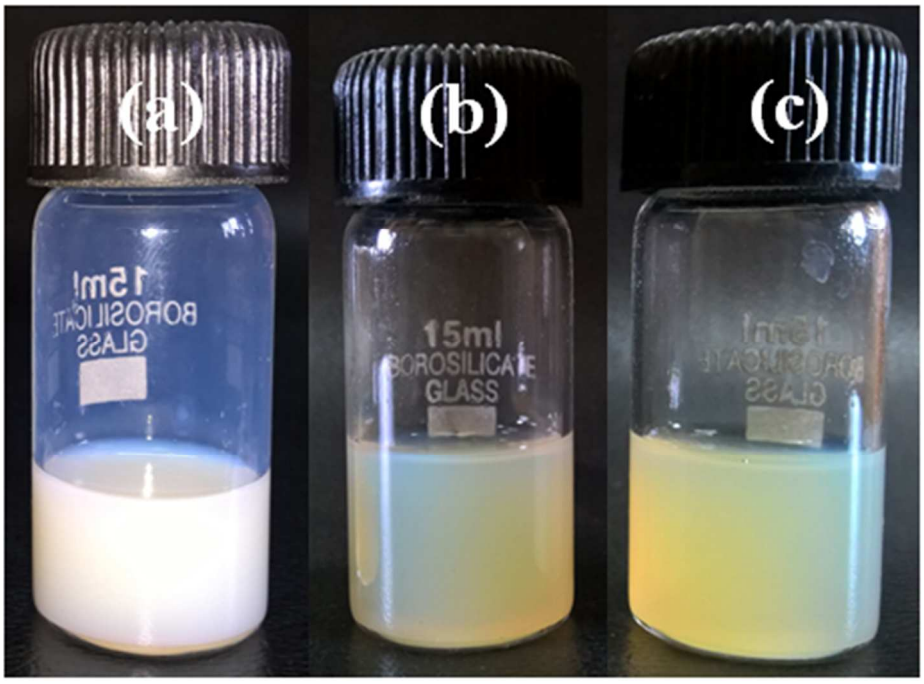


Figure S2. Visual appearance of PUDs (a) PUD-P5 (b) PUD-P10 (c) PUD-P15.

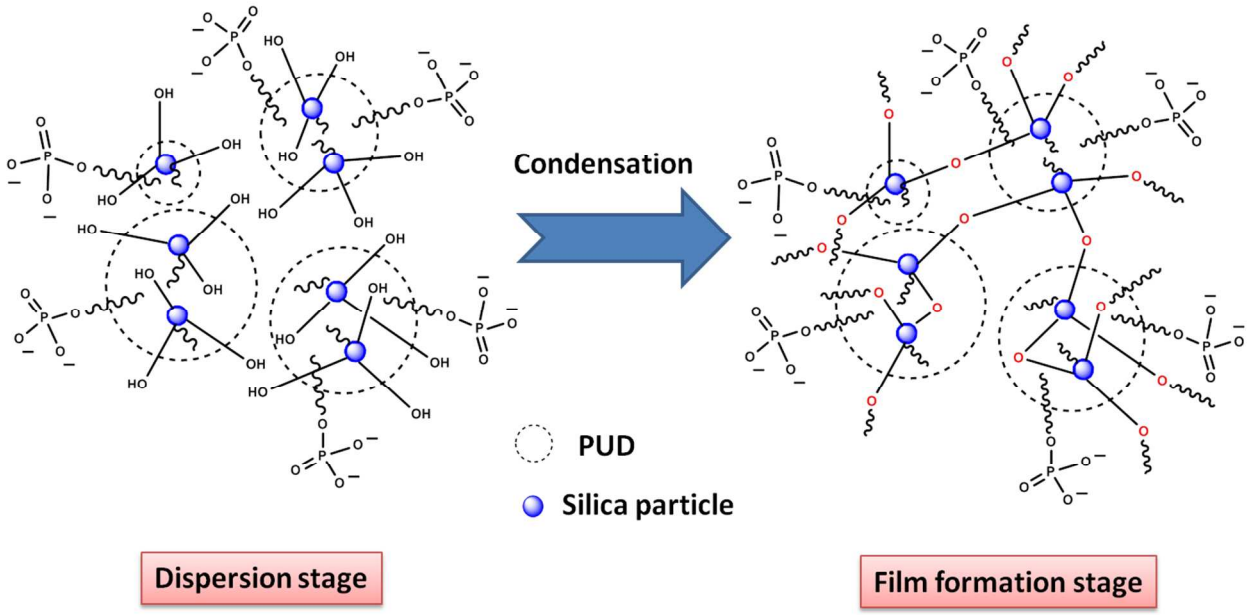
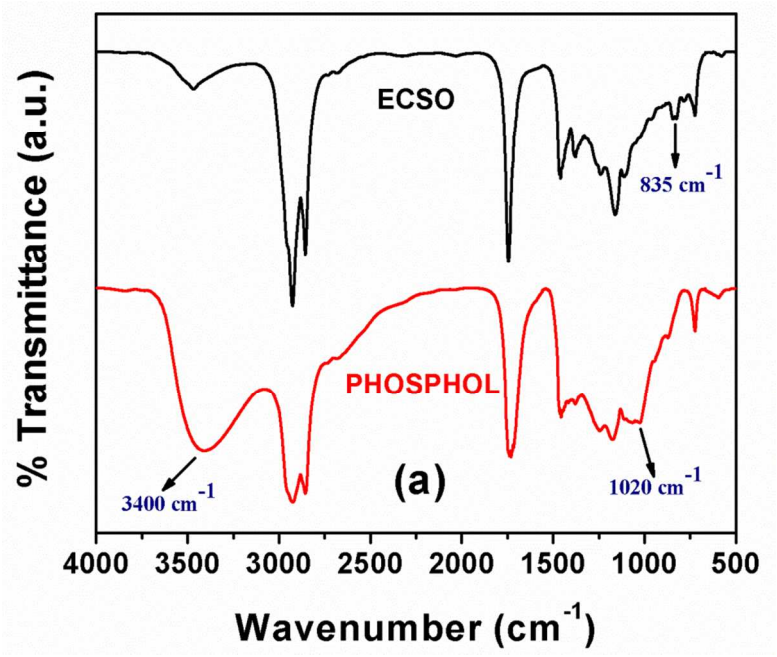


Figure S3. Probable mechanism of Phospol-PUD film curing process through the formation of siloxane cross-links.



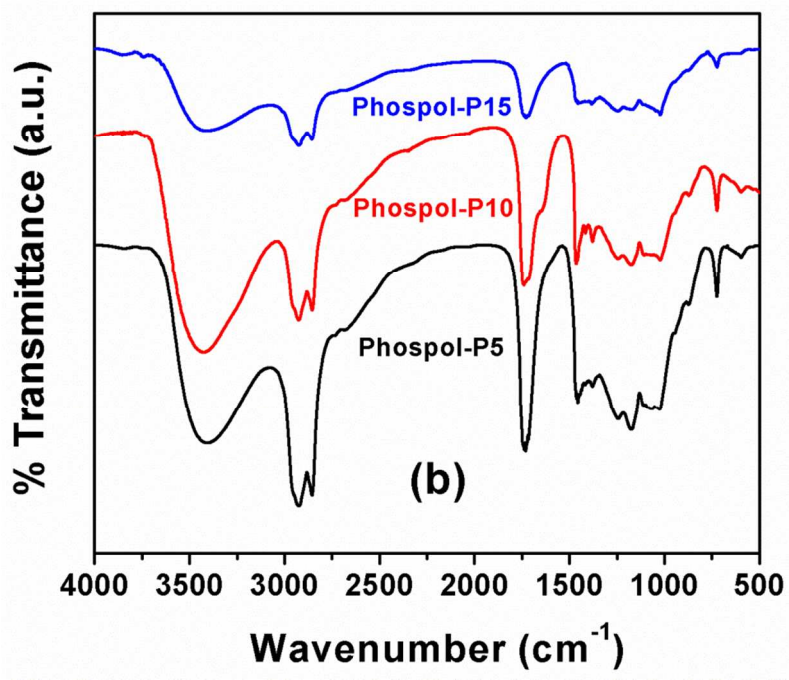


Figure S4. FT-IR spectra of **(a)** ECSO and Phospol ; **(b)** phospol-P5, P10, and P15.

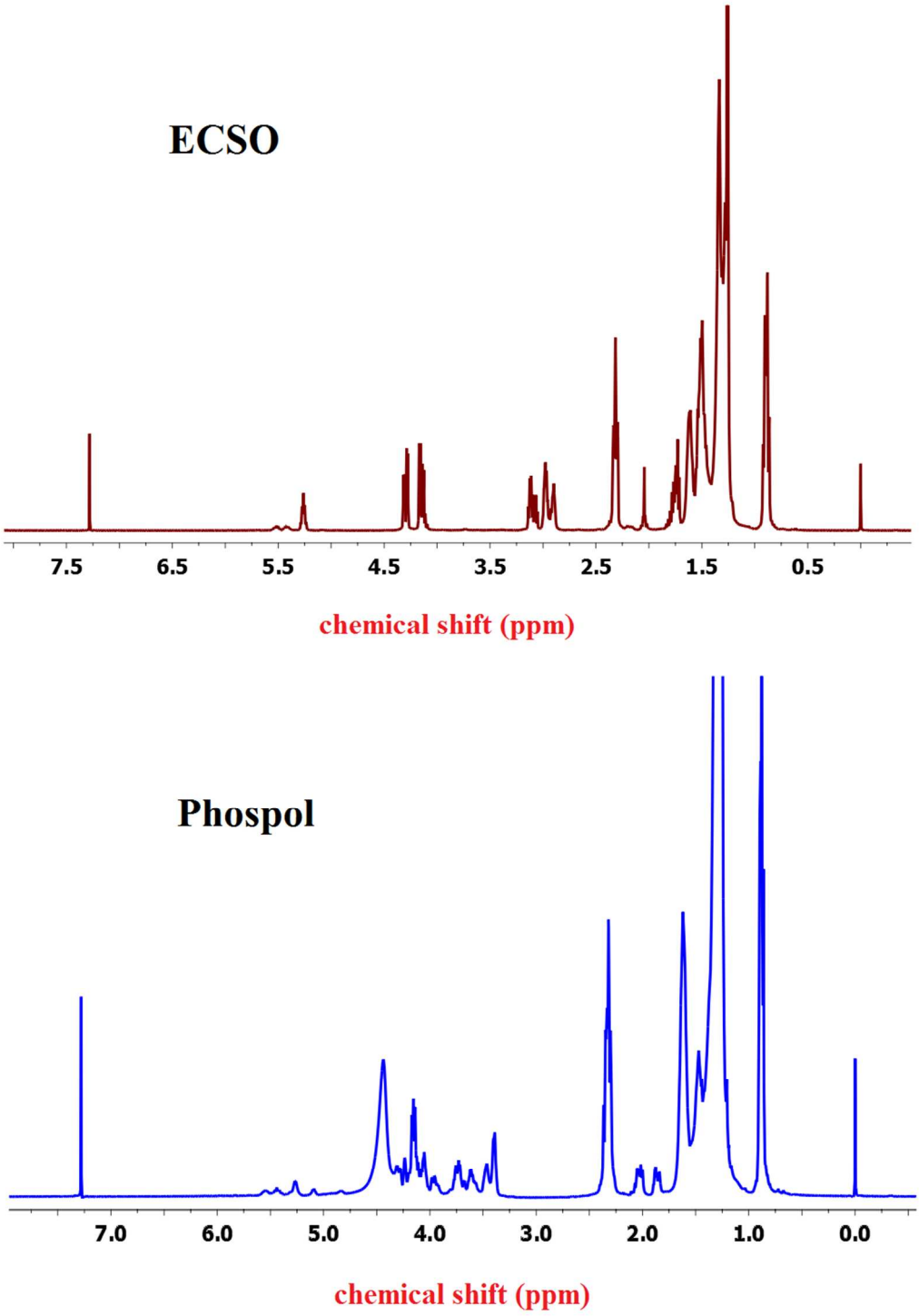


Figure S5. ^{1}H NMR spectra of ECSO and Phospol.

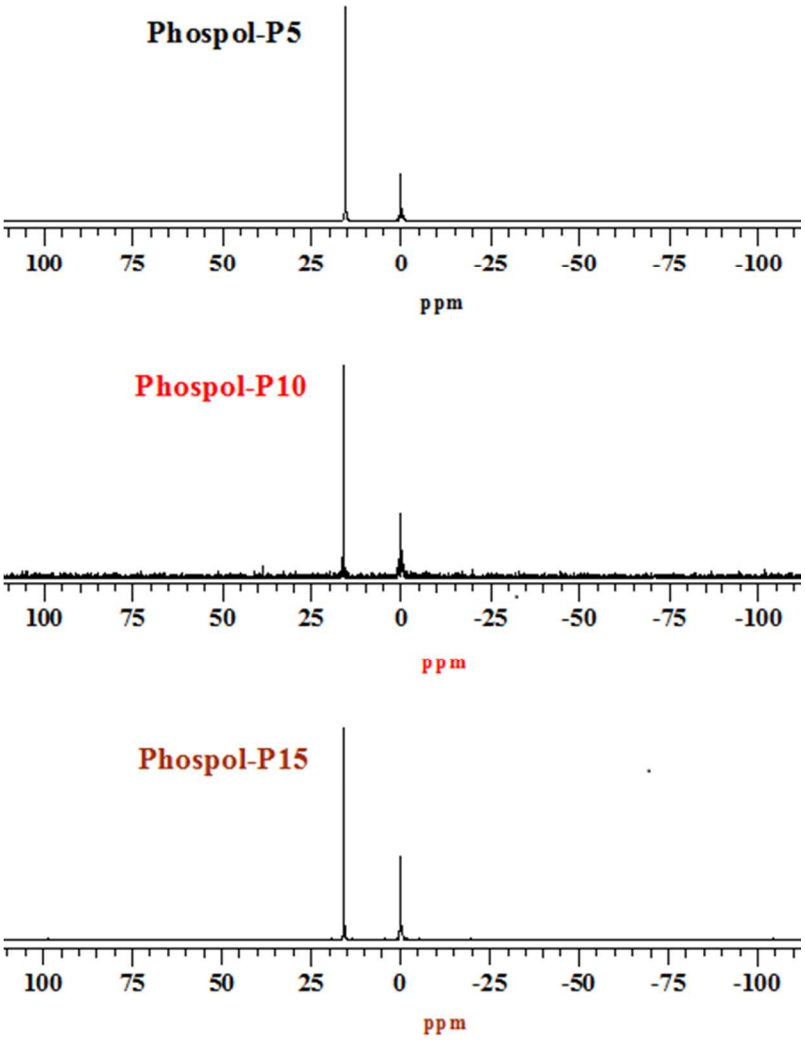


Figure S6. ^{31}P NMR spectra of phospols.

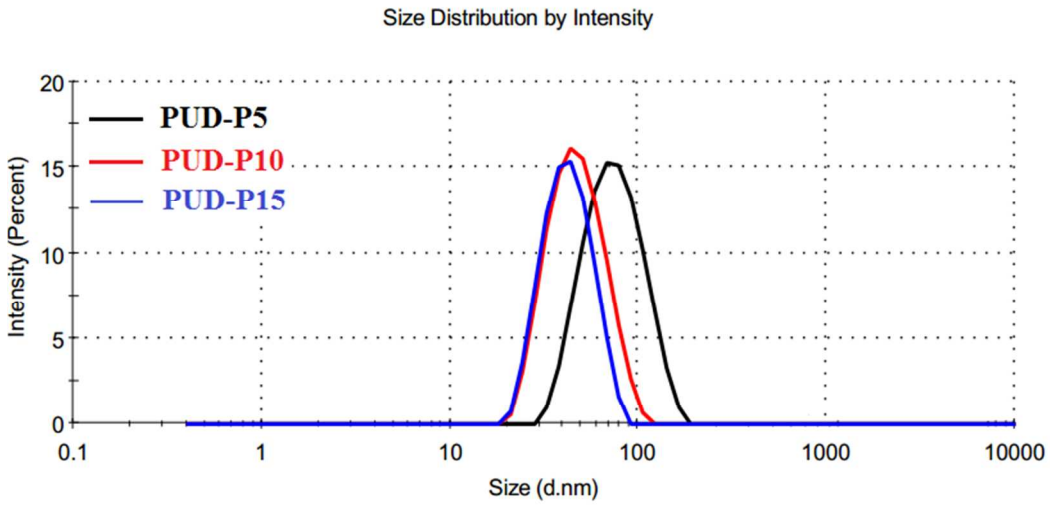


Figure S7. Particle size distribution of phospol based PU dispersion.

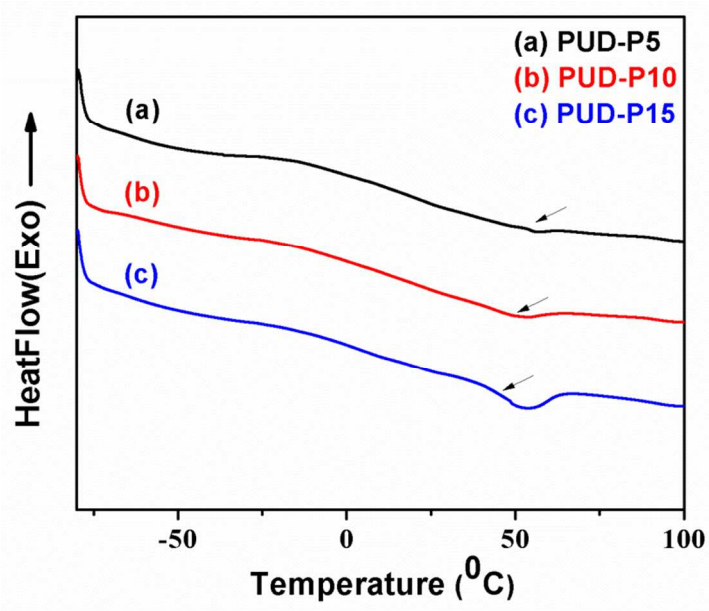


Figure S8. DSC scans of phospol PUD films

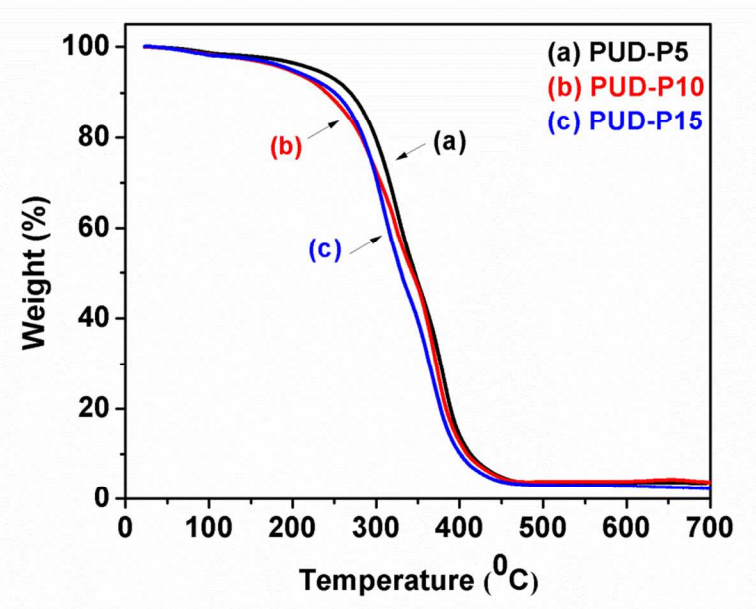


Figure S9. TGA curves of phospol PUD films.