Supporting Information

Whole procedure solvent free route to CO_2 based waterborne polyurethane by elevated temperature dispersing strategy

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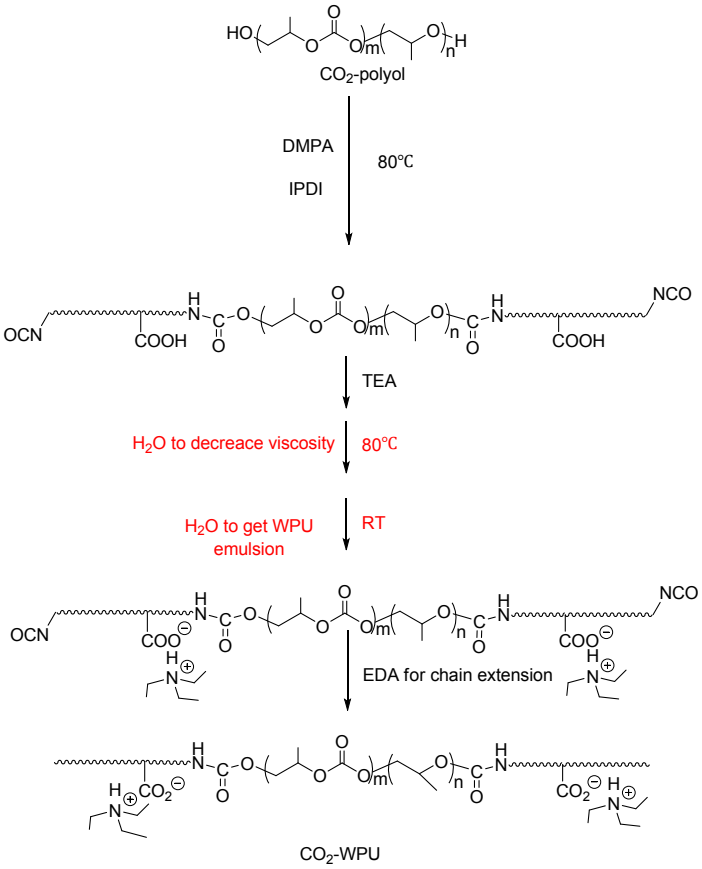
Supporting information mentioned in main article

Scheme S1. Whole procedure VOC free preparation of CO_2-WPU by elevated temperature dispersing (ETD)strategy.



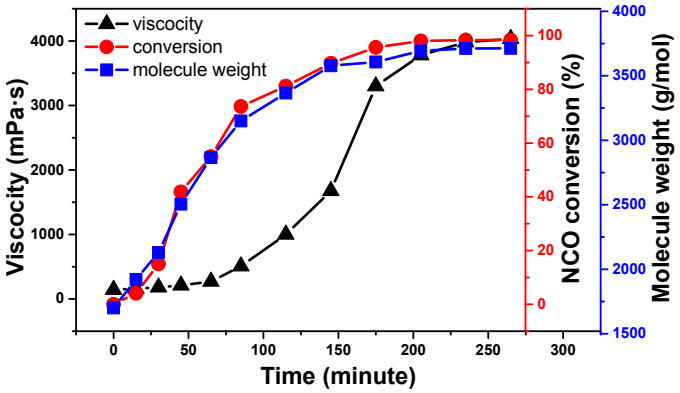


Figure.S1 Dependences of reactant viscosity, NCO conversion and molecular weight of reactant on reaction time (for typical CO_2-WPU).

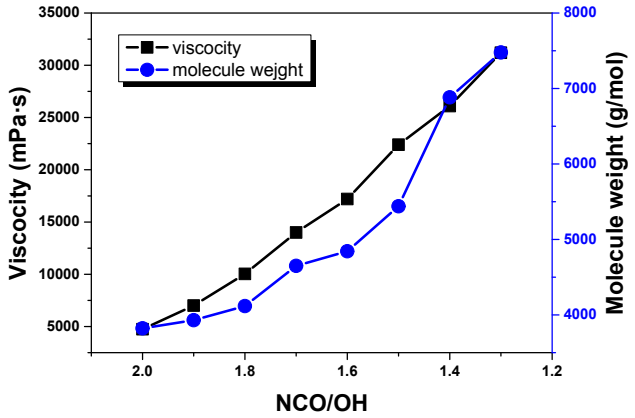


Figure.S2 Dependence of viscosity and molecule weight of prepolymer on NCO/OH from IPDI and CO_2-polyol with M_n of 1350 g/mol and carbonate content of 30%.

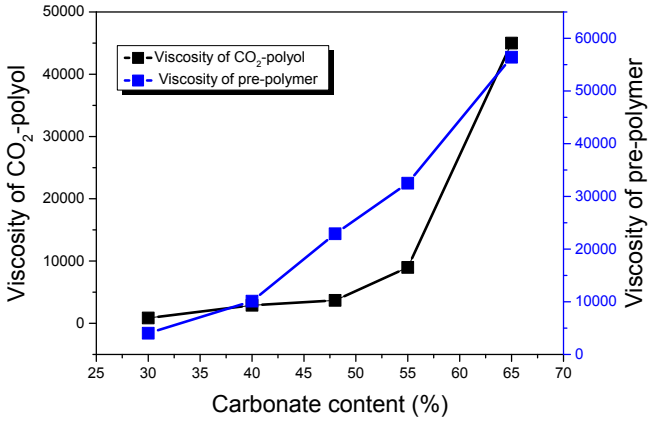


Figure.S3 Dependence of viscosity of CO_2-polyol and prepolymer on carbonate content of CO_2-polyol with similar M_n of 1400 g/mol, NCO/OH to be 2, and IPDI as the diisocyanate.

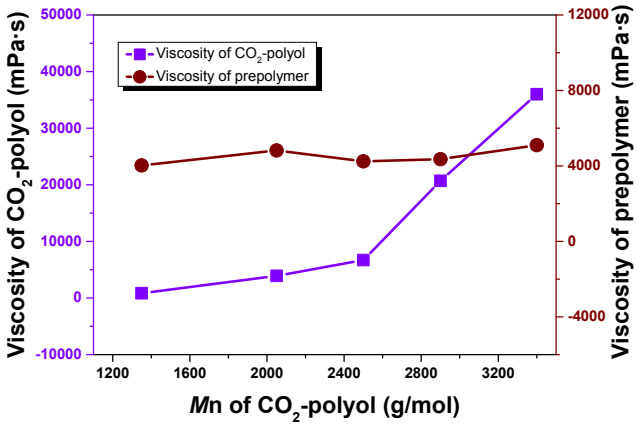


Figure.S4 Dependence of viscosity of CO_2-polyol and prepolymer on molecule weight of CO_2-polyol with uniform carbonate content of 30%, NCO/OH to be 2, and IPDI as the diisocyanate.

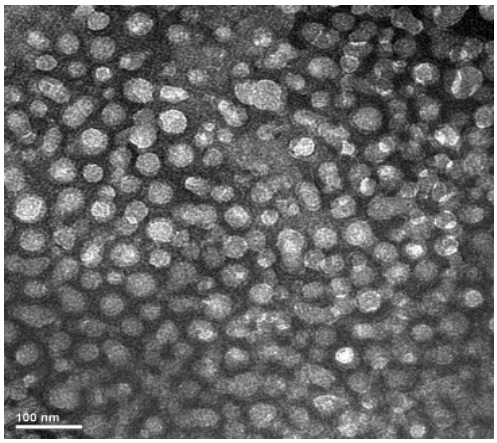


Figure.S5 TEM image of CO_2-WPU emulsion particles.

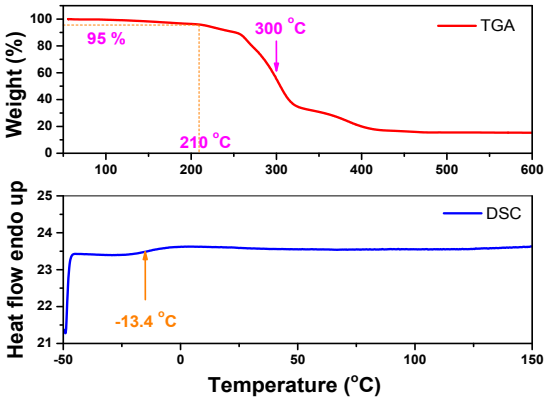


Figure.S6 TGA and DSC trace of CO_2-WPU multi-film.

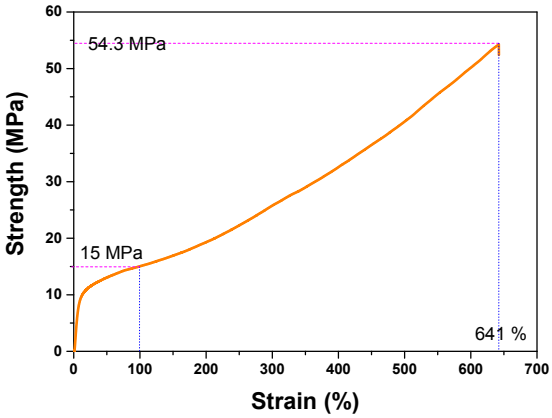


Figure.S7 Tensile stress strain curve of typical CO_2-WPU dried film.

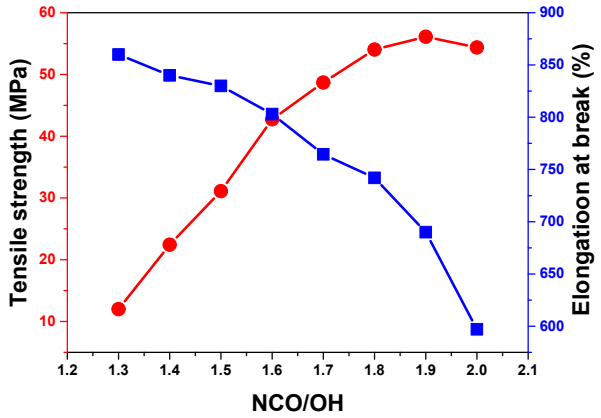


Figure.S8 Dependence of tensile strength and elongation at break of CO_2-WPUs on NCO/OH of prepolymer.

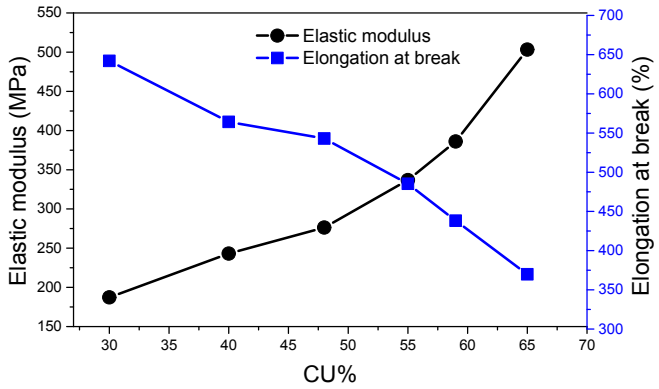


Figure.S9 Dependence of elastic modulus and elongation and break of CO_2-WPUs on carbonate content of CO_2-polyol.

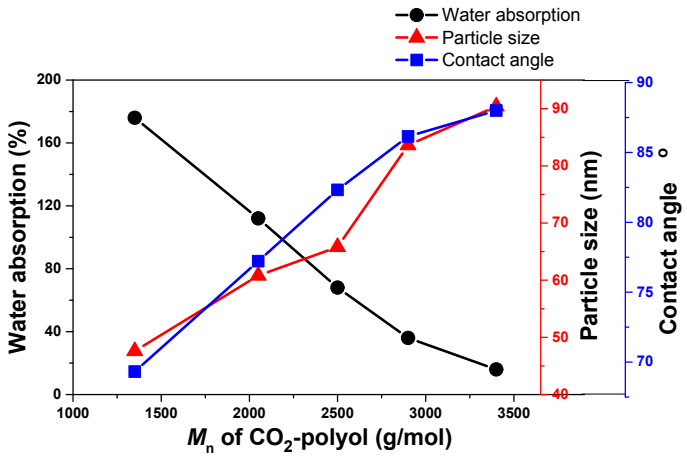


Figure.S10 Dependence of particle size, contact angle, and water absorption on M_n of CO_2-polyol.

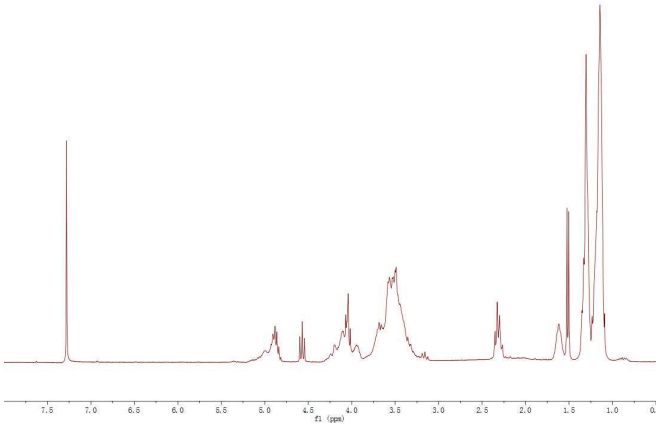


Figure.S11a ^{1}H-NMR spectral of CO_2-polyol with carbonate content (CU%) and molecule weight (M_n) respectively to be 30% and 1350 g/mol.

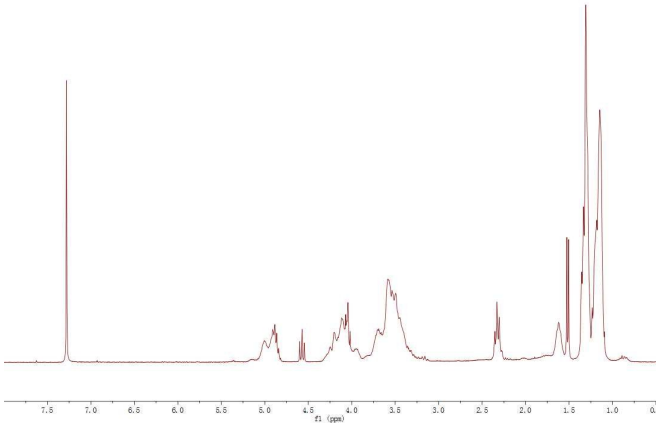


Figure.S11b ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 40% and 1450 g/mol.

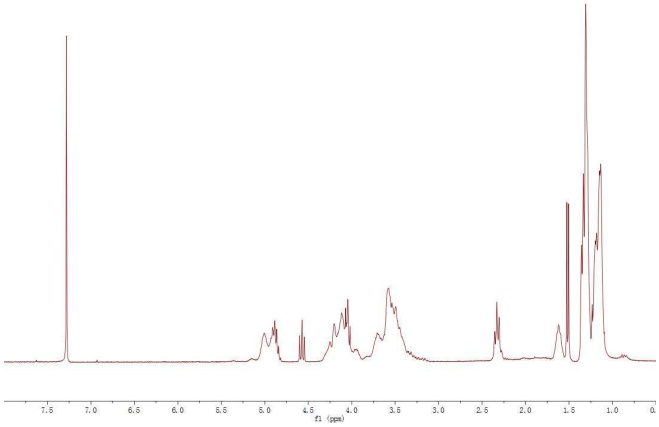


Figure. S11c ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 48% and 1400 g/mol..

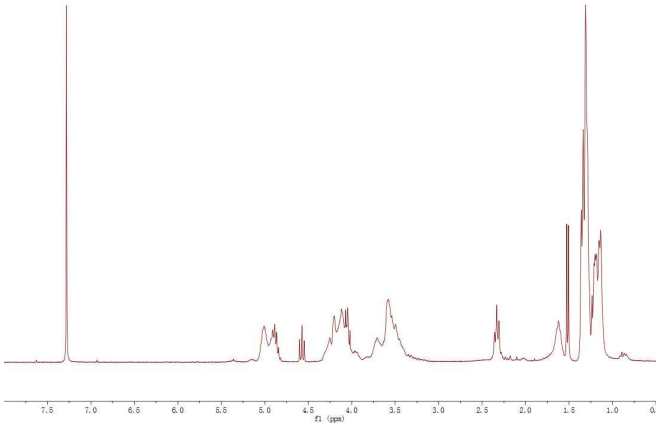


Figure. S11d ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 55% and 1400 g/mol.

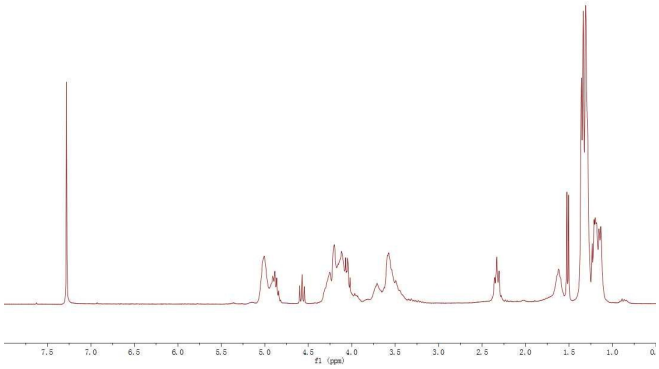


Figure. S11e ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 65% and 1450 g/mol.

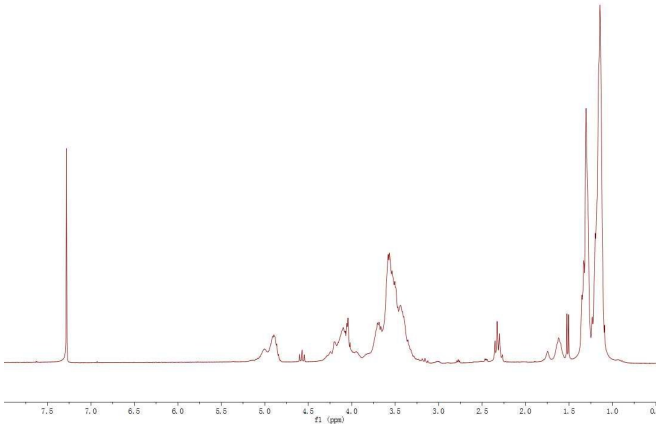


Figure. S11f ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 30% and 2050 g/mol.

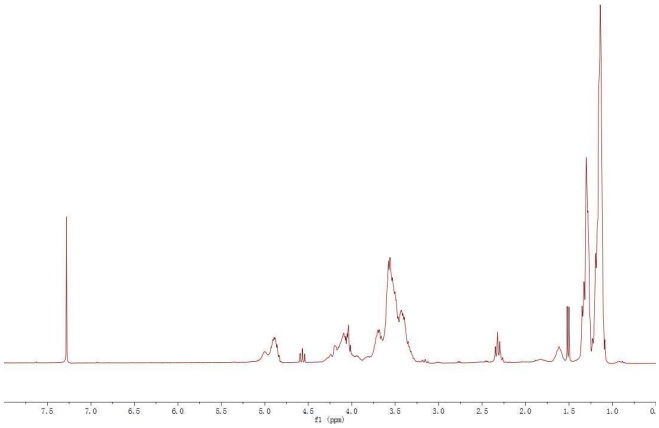


Figure. S11g ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 30% and 2500 g/mol.

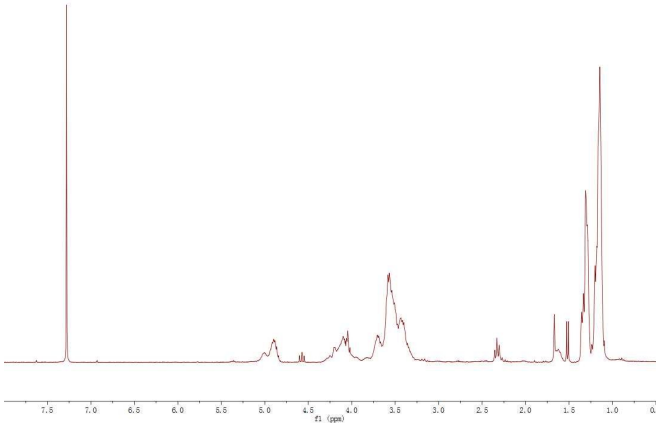


Figure. S11h ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 30% and 2900 g/mol.

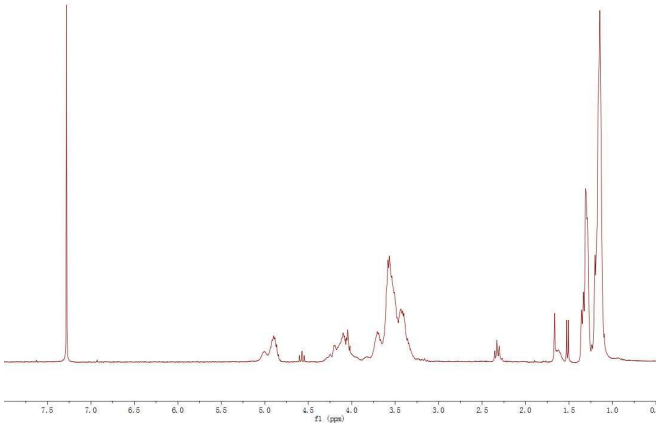


Figure. S11i ^{1}H-NMR spectral of CO_2-polyol with CU% and M_n respectively to be 30% and 3400 g/mol.

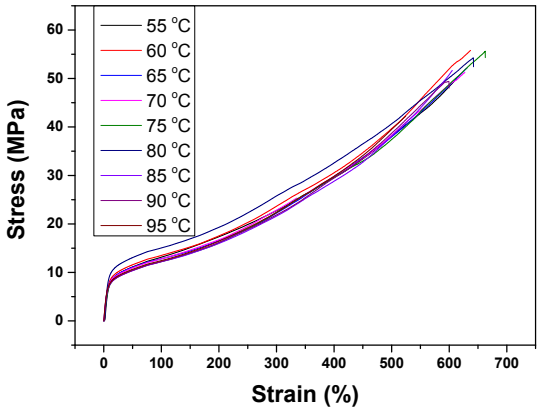


Figure. S12. Tensile stress strain curves of typical CO_2-WPU with different dispersing temperature.

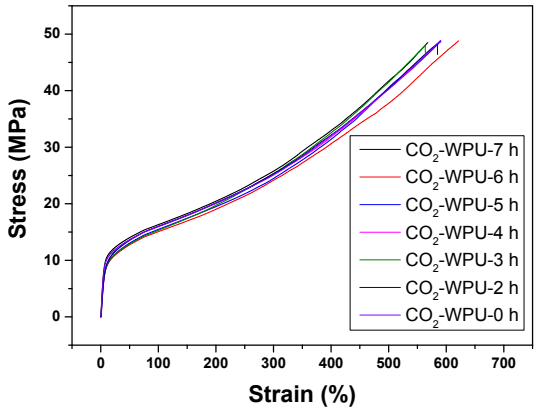


Figure. S13. Tensile stress strain curves of CO_2-WPU from CO_2-polyol with CU% and M_n respectively to be 30% and 2050 g/mol.after different immersion time in 0.5% NaOH aqueous solution.

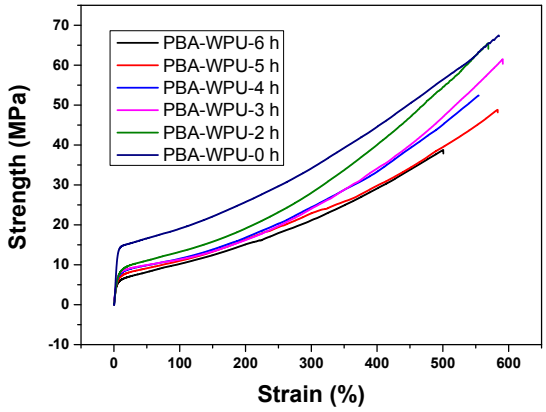


Figure. S14. Tensile stress strain curves of PBA-WPU after different immersion time in 0.5% NaOH aqueous solution.

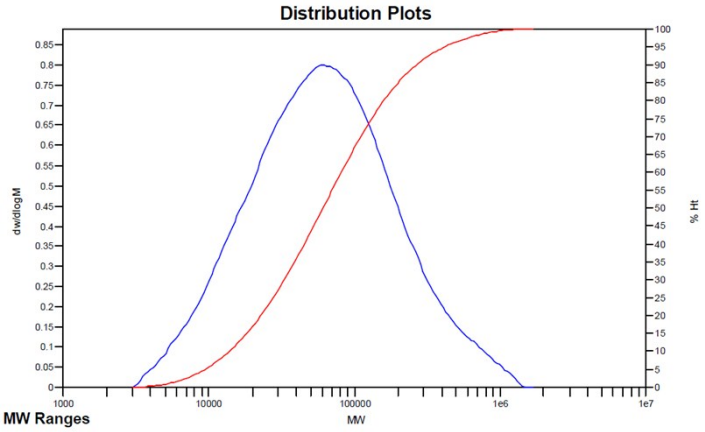


Figure.S15 GPC spectra of typical CO_2-WPU.