

Electronic Supplementary Information for

Synthesis, order-to-disorder transition, microphase morphology and mechanical properties of BAB triblock copolymer elastomers with hard middle block and soft outer blocks†

Wentao Wang,^a Xuehui Wang,^a Feng Jiang^b and Zhigang Wang^{*a}

^aCAS Key Laboratory of Soft Matter Chemistry, Department of Polymer Science and Engineering, Hefei National Laboratory for Physical Sciences at the Microscale, University of Science and Technology of China, Hefei, Anhui Province 230026, P. R. China. Email: zgwang2@ustc.edu.cn; Fax: +86 0551-6 3607703; Tel: +86 0551-63607703

^bSchool of Chemical Engineering and Light Industry, Guangdong University of Technology, Guangzhou, Guangdong Province 510006, P. R. China

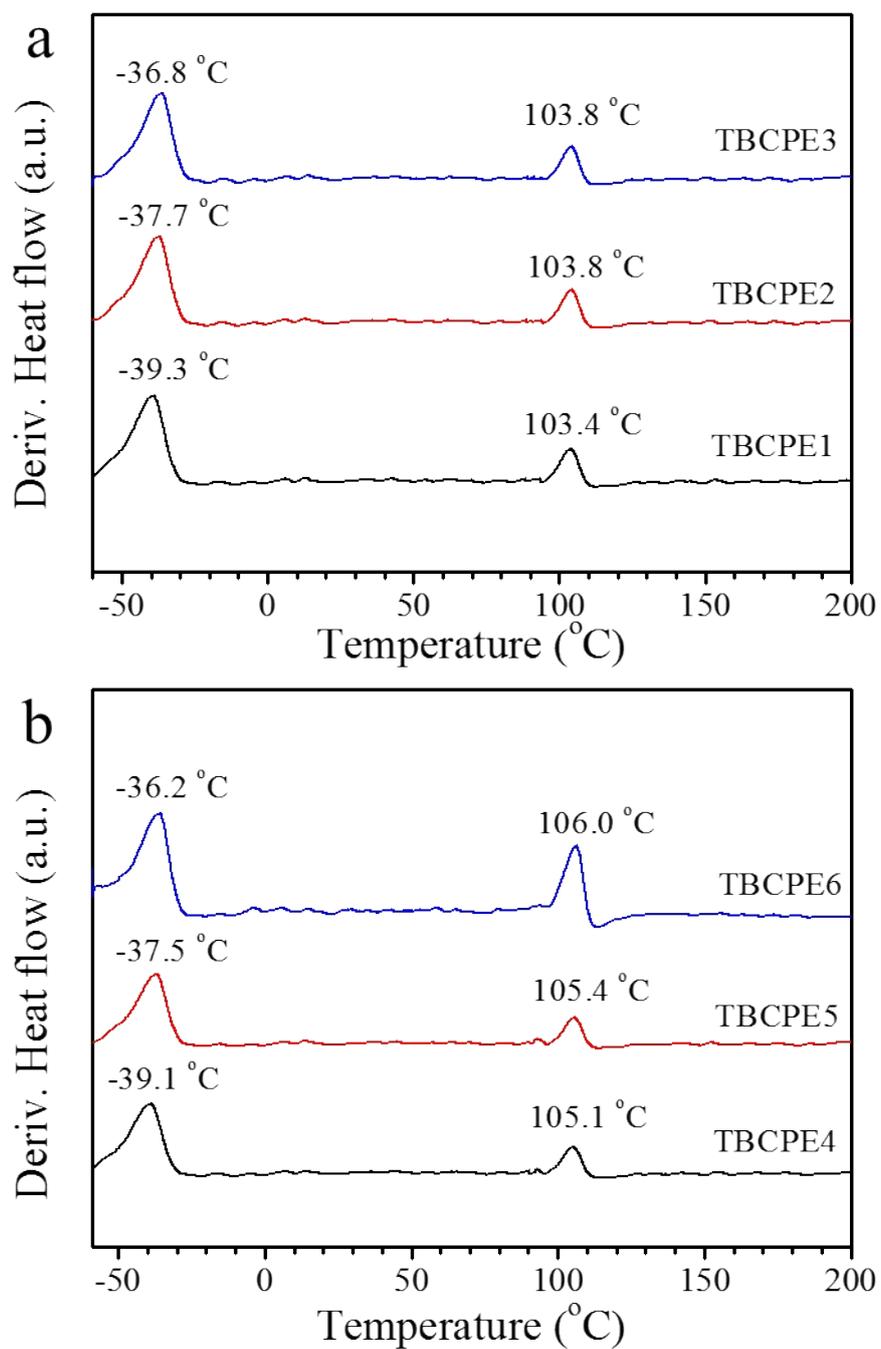


Fig. S1 Temperature derivative heat flow curves from DSC measurements in a nitrogen atmosphere at a heating rate of $10\text{ }^{\circ}\text{C}/\text{min}$ for (a) TBCPE1, TBCPE2 and TBCPE3, and (b) TBCPE4, TBCPE5 and TBCPE6.

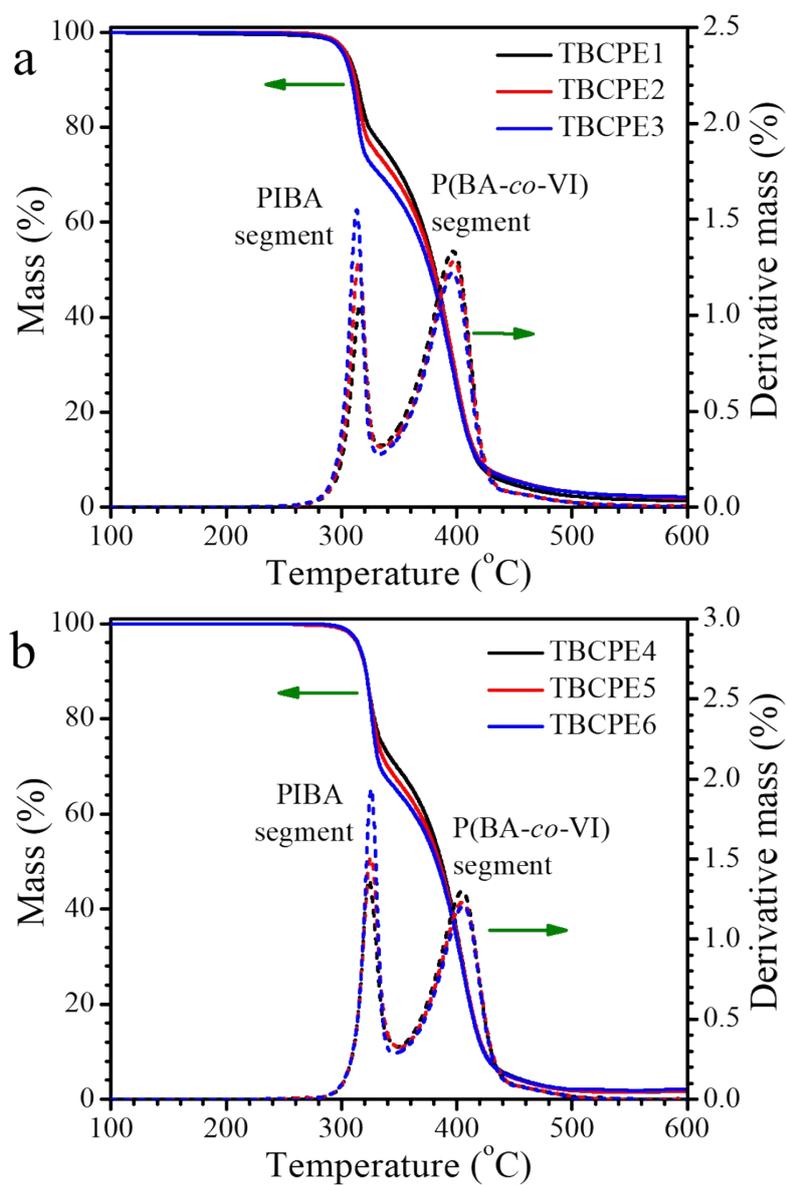


Fig. S2 Mass loss curves and derivative mass loss curves from TGA measurements in a nitrogen atmosphere at a heating rate of 10 °C/min for (a) TBCPE1, TBCPE2 and TBCPE3, and (b) TBCPE4, TBCPE5 and TBCPE6.

Table S1 Thermal properties for TBCPEs and PIBA contents determined from TGA curves

sample code	PIBA content (wt%)	$T_{\max, \text{PIBA}}$ (°C)	$T_{\max, \text{P(BA-co-VI)}}$ (°C)
TBCPE1	22.5	316	396
TBCPE2	25.1	315	397
TBCPE3	28.2	313	397
TBCPE4	28.8	325	405
TBCPE5	31.5	326	405
TBCPE6	32.5	326	405

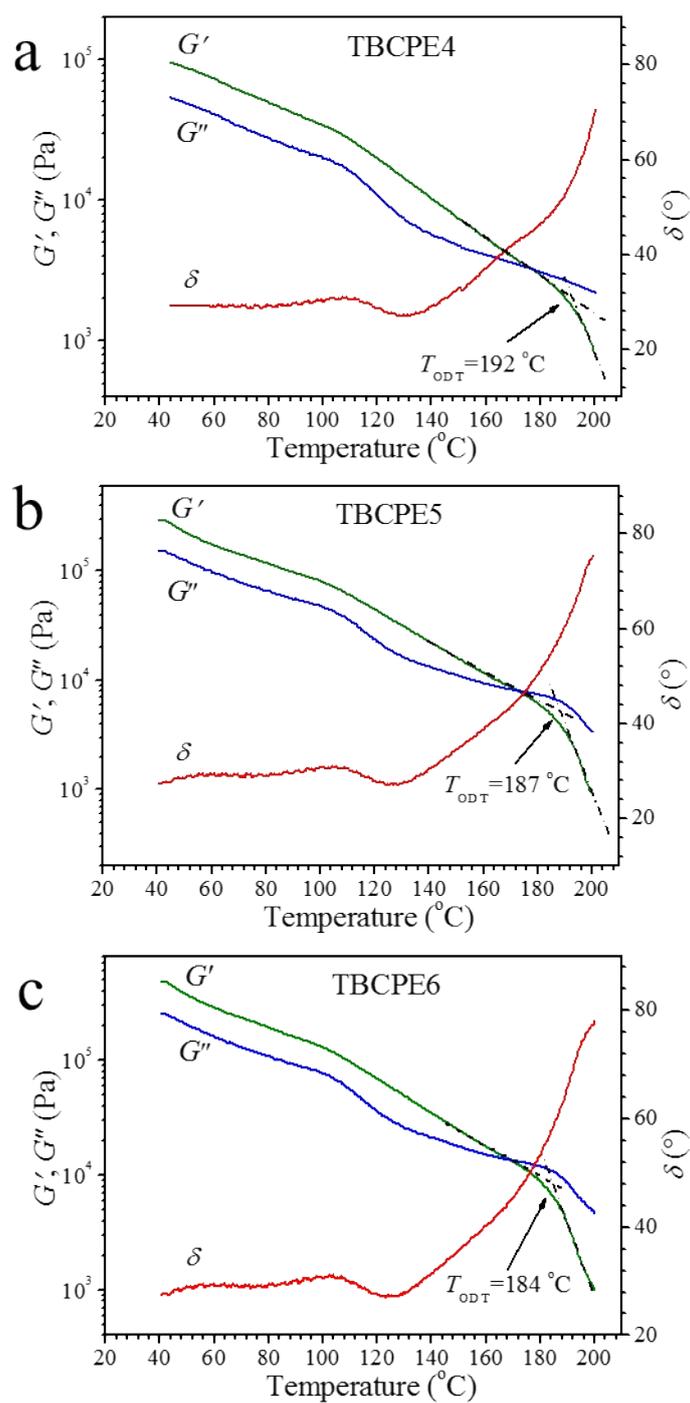


Fig. S3 Temperature dependences of storage modulus, G' , loss modulus, G'' , and loss angle, δ , as obtained at a strain amplitude of 1% and a single frequency of $\omega = 1.0$ rad/s during cooling for samples (a) TBCPE4, (b) TBCPE5, and (c) TBCPE6. The cooling rate is $1^{\circ}\text{C}/\text{min}$. The discontinuity in G' at T_{ODT}

results from the microphase separation transition.

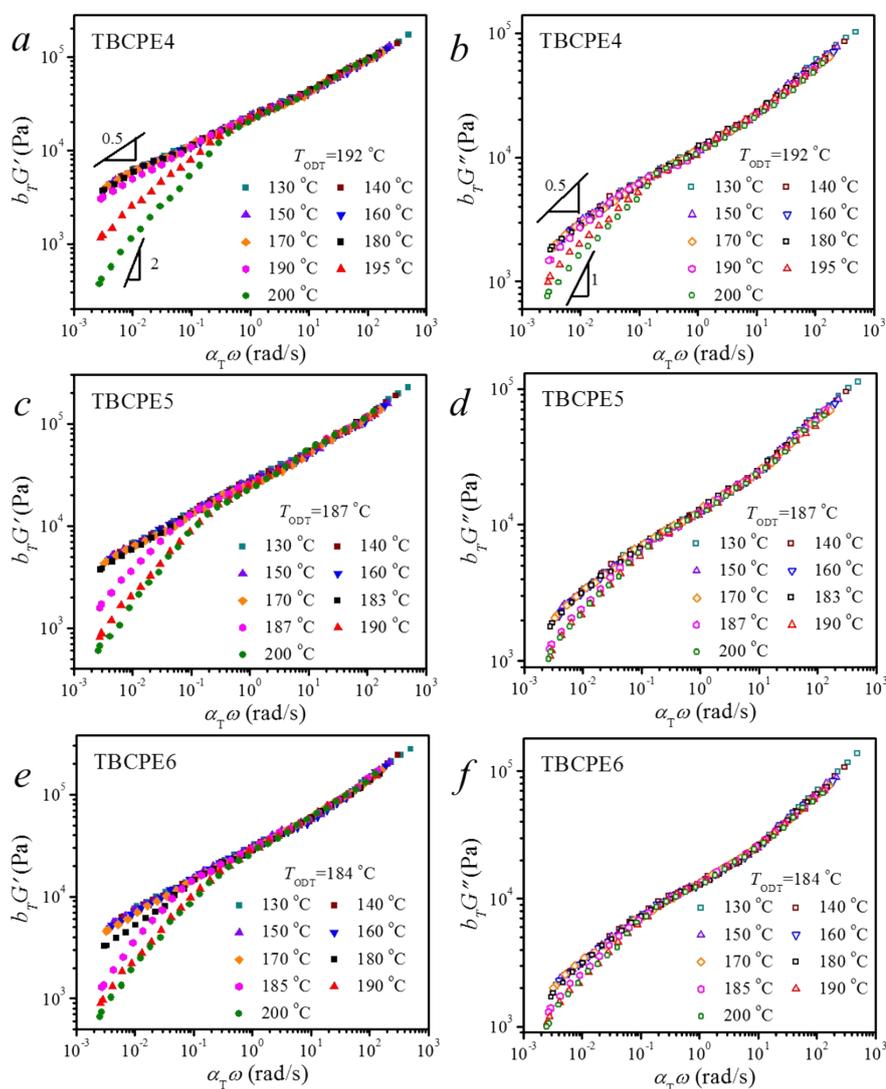


Fig. S4 TTS master curves for (a, b) TBCPE4, (c, d) TBCPE5, and (e, f) TBCPE6 near the order-to-disorder transition (T_{ODT}) showing the branching of the curves at low frequencies ($\omega < \omega_c$) above T_{ODT} . The reference temperature, T_r was 130 °C.

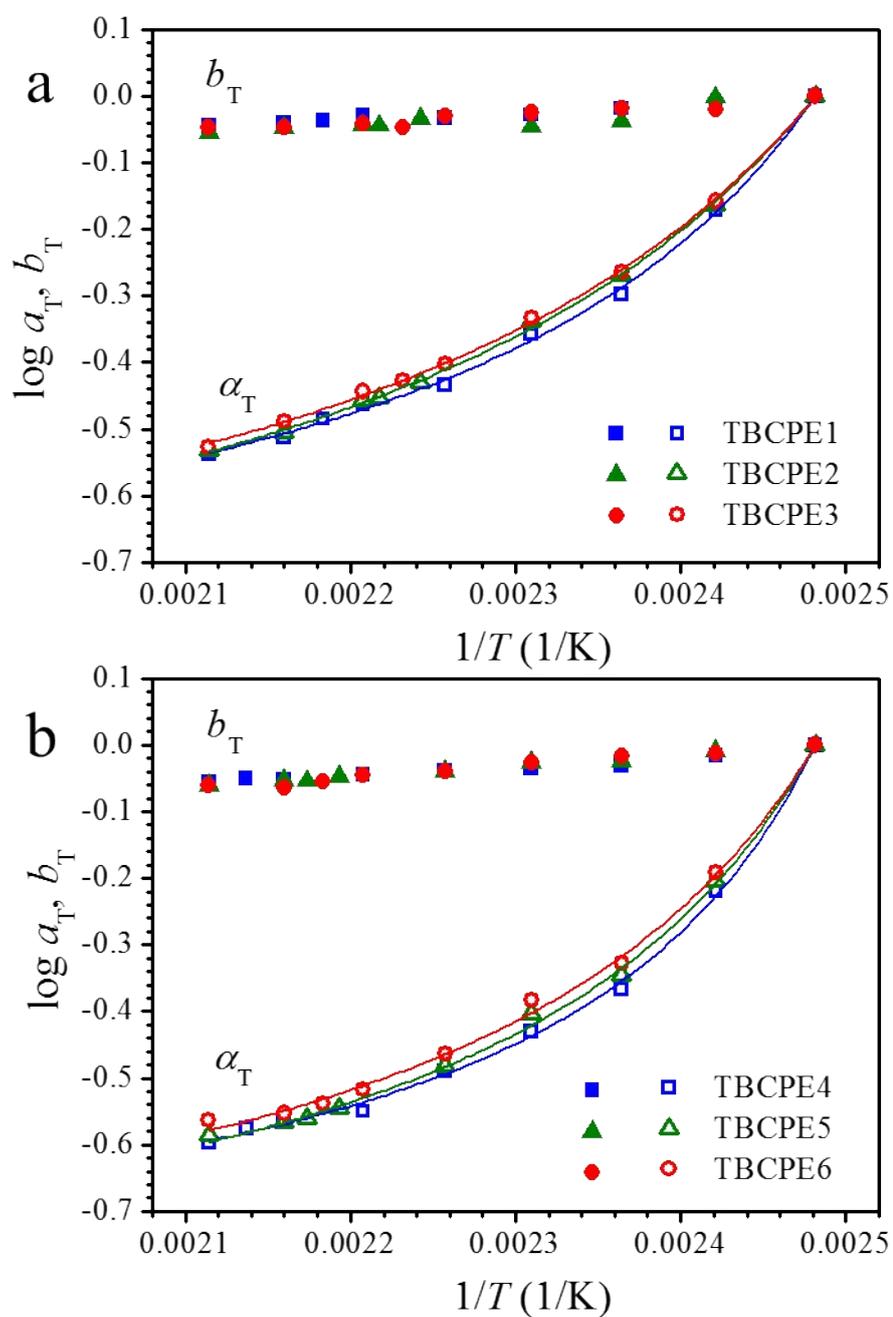


Fig. S5 Shift factors, α_T and b_T versus inverse temperature, $1/T$ with $T_f = 130$ °C for (a) TBCPE1, TBCPE2 and TBCPE3, and (b) TBCPE4, TBCPE5 and TBCPE6.

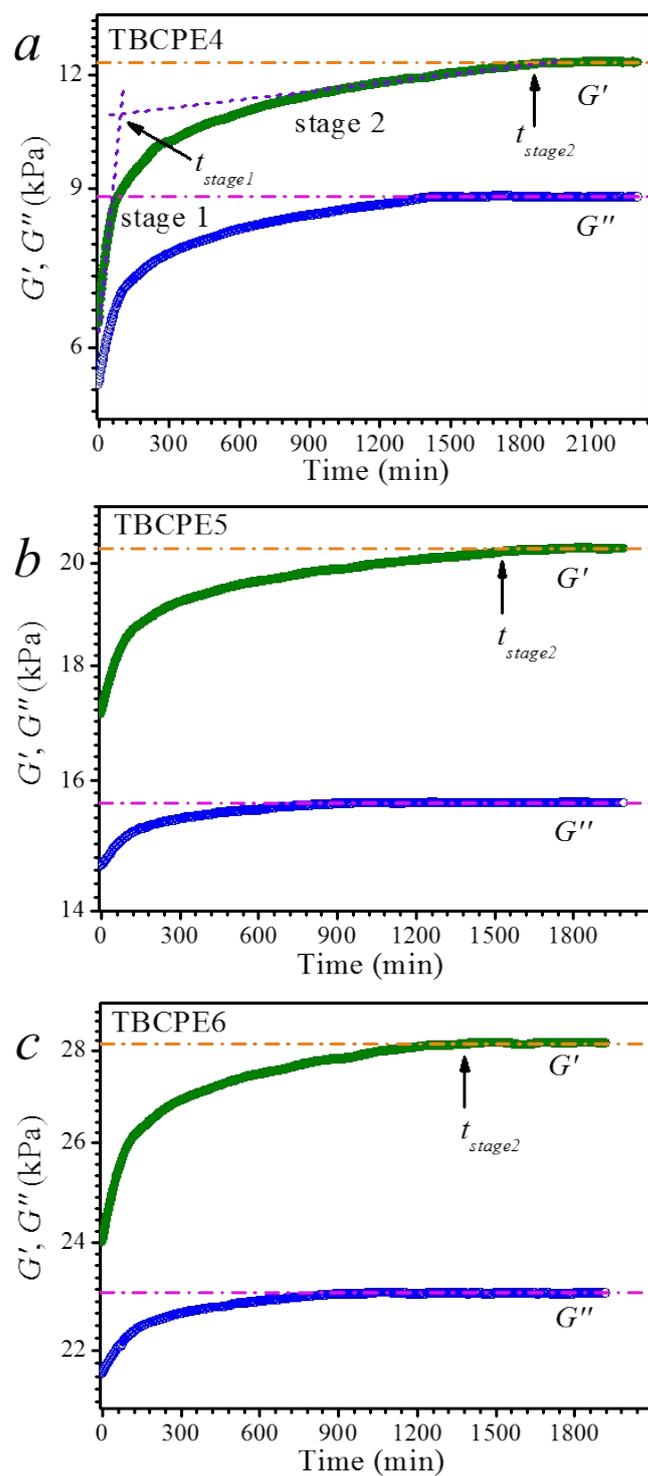


Fig. S6 Evolutions of storage modulus, G' , and loss modulus, G'' , in samples (a) TBCPE4, (b) TBCPE5, and (c) TBCPE6 following a quench from the disordered state at 200 °C to 130 °C, which was below T_{ODT} .

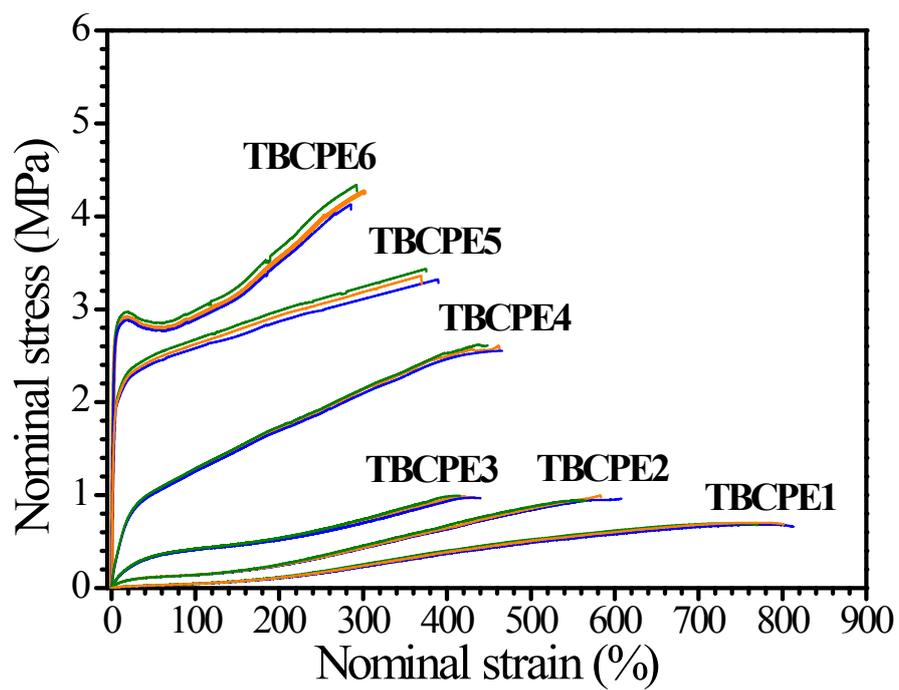


Fig. S7 Monotonic nominal stress-strain curves for TBCPE1, TBCPE2, TBCPE3, TBCPE4, TBCPE5 and TBCPE6 prior to thermal treatment.