Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Experimental evidence of co-existence of equilibrium and nonequilibrium in two-glass-transition miscible mixtures

Xiao Jin[1], Yuxing Guo[1], Wenkang Tu[1], Shidong Feng[1], Yingdan Liu,[1] Thomas Blochowicz[2], and Li-Min Wang[1,*]

[1]*State Key Lab of Metastable Materials Science and Technology, and College of Materials Science and Engineering, Yanshan University, Qinhuangdao, Hebei, 066004 China*

[2] *Institut für Festkörperphysik, Technische Universität Darmstadt, 64289 Darmstadt, Germany*

Supporting Information

ADDITIONAL PLOTS

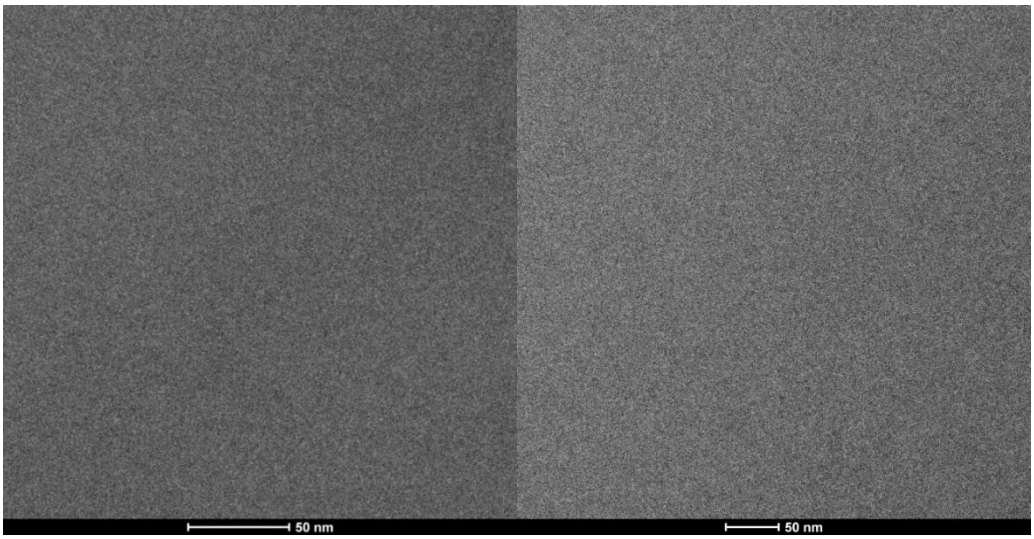

FIG. S1 36 wt.% of the samples were cooled by liquid nitrogen and then viewed with a cryo-electron microscope. scale bar: 50 nm.

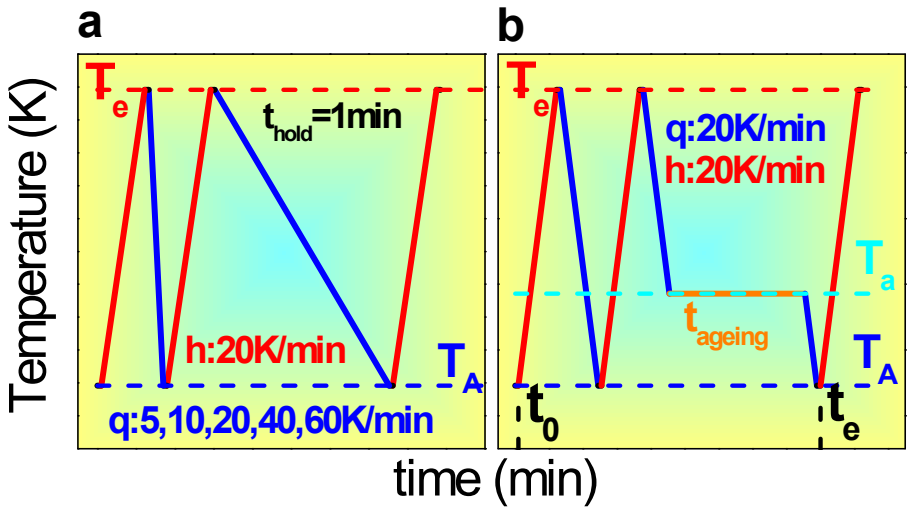

FIG. S2 Sample ageing and quenching protocols are shown in Fig. S2(a) and Fig. S2(b). The cooling rate of the first blue line in S2(a) is 20K/min to eliminate the last thermal history. The cooling rates of the second blue line changes one by one.

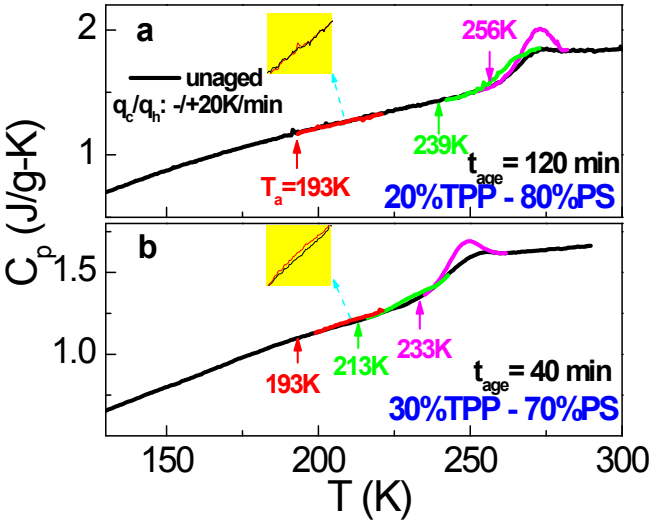

Fig. S3. Ageing effects in the subsequent heating heat capacity Cp curves for the 20wt.% (a) and 30wt.% (b) TPP samples. The cooling/heating rate of -/+20 K/min is fixed for the measurements. The insets show the local blow-up of the C_p curves of the glasses before and after ageing at indicated temperatures. Ageing time is shown in each panel.

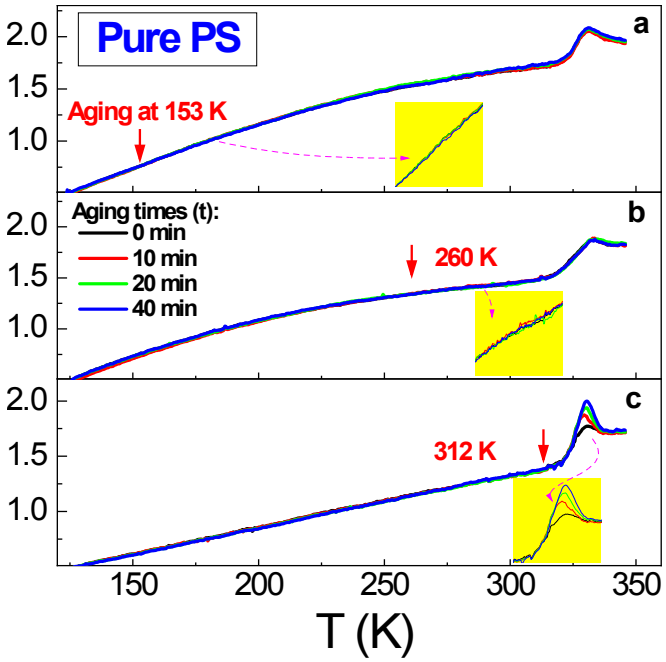

Fig. S4. Ageing effects in the subsequent heating heat capacity Cp curves for the PS sample. The cooling/heating rate of -/+20 K/min is fixed for the measurements. (a), (b) and (c) are ageing at 153K， 260K and 312K respectively. The insets show the local blow-up of the C_p curves of the glasses before and after ageing at indicated temperatures. Ageing time is shown in panel.

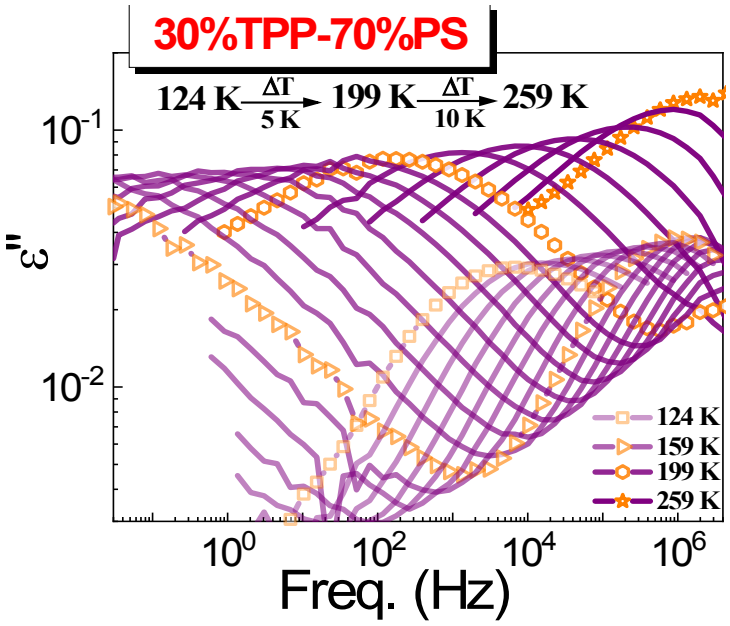

FIG. S5 Isothermal dielectric loss spectra of 30% TPP-70% PS with 5 K interval from 124 to 199 K and 10 K interval from 209 to 259 K.

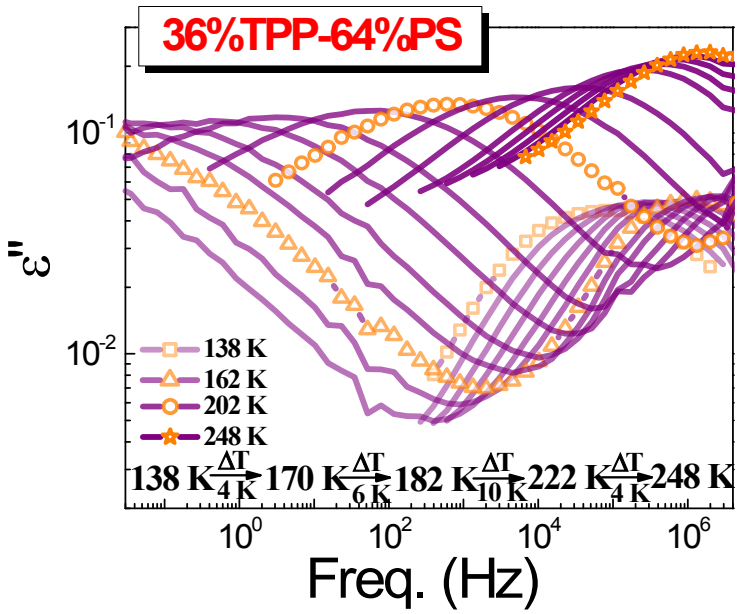

FIG. S6 Isothermal dielectric loss spectra of 36% TPP - 64% PS with 4 K interval from 138 to 170 K, 6 K interval from 176 to 182 K,10 K interval from 192K to 222 K and 4 K interval from 226 K to 248 K.

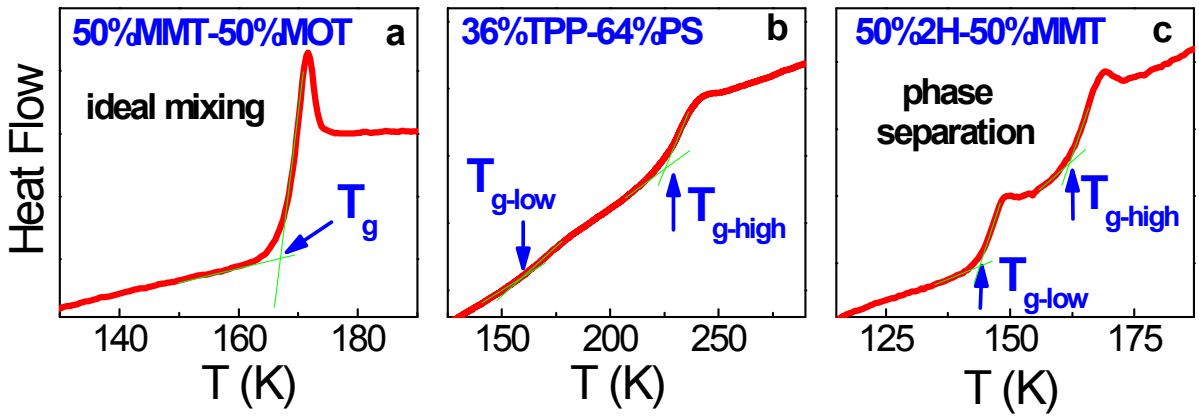

Fig. S7. Heat flow curves of three typical binary systems showing one T_g of an ideal mixing system (a), two T_gs in a miscible mixture (b), and two T_gs in a phase separation system (c).

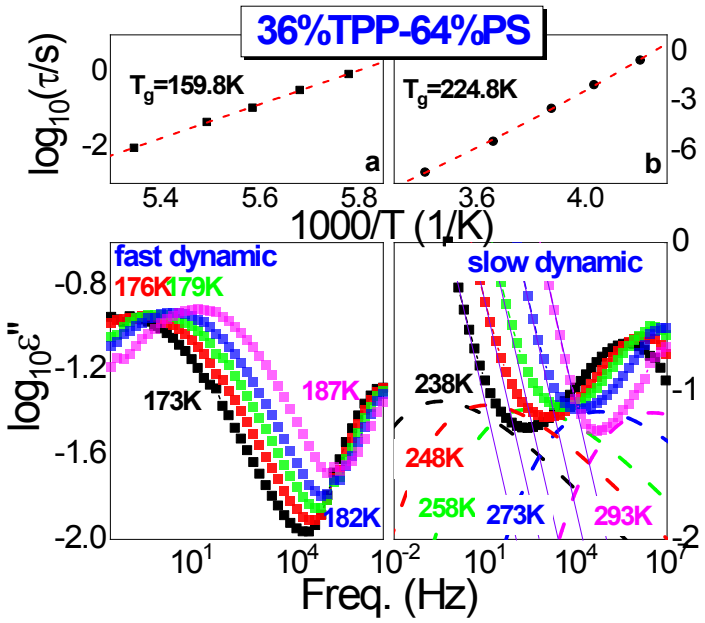

FIG. S8 Relaxation time against 1000/*T* of the α-relaxation in 36% TPP - 64% PS in upper panel, and the fast and slow dynamic structural relaxation correspond to left and right respectively. The VFT equation fitting the relaxation times (τ_{max}) are presented by the dashed lines, and the T_g values are shown in Figure 1d the inset. The below panel shows the dielectric spectra to the peak frequency and peak height at temperature range from 173 to 182 K and 187 K, 238K to 258 K and 273 K to 293 K. As with 30% samples, fast dynamics uses a comparison with Debye FWHM to estimate the β_{KWW}, and slow dynamics uses HN equation (α_{HN}=0.46, γ_{HN}=0.34) or One-sided Fourier transition of the KWW equation fitting.