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Supporting Information

A Strategy for Significant Improvement of Strength of Semi-crystalline Polymers with the Aid of Nanoparticles

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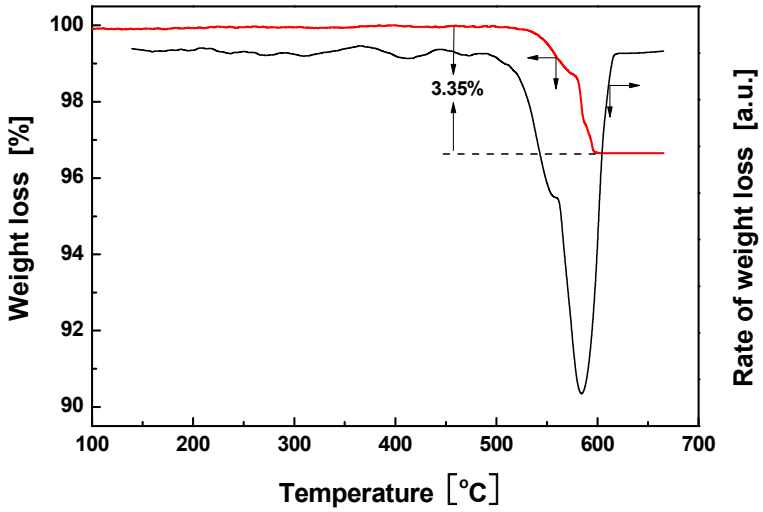


Fig. S1 Typical thermogravimetric curves of SiO_2-g-PBA prepared by irradiation polymerization.

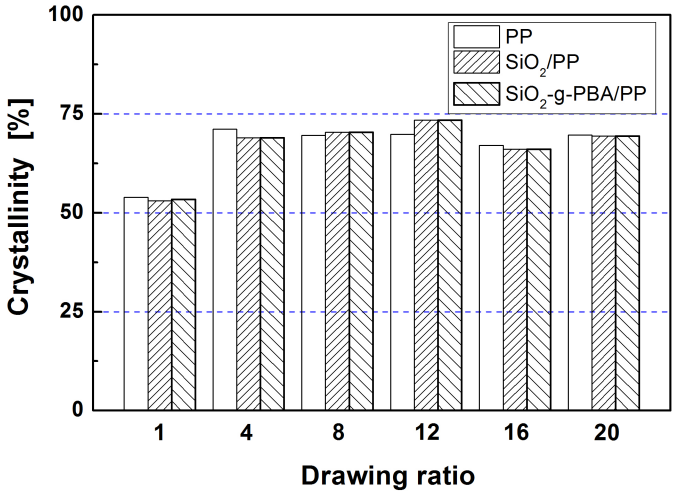
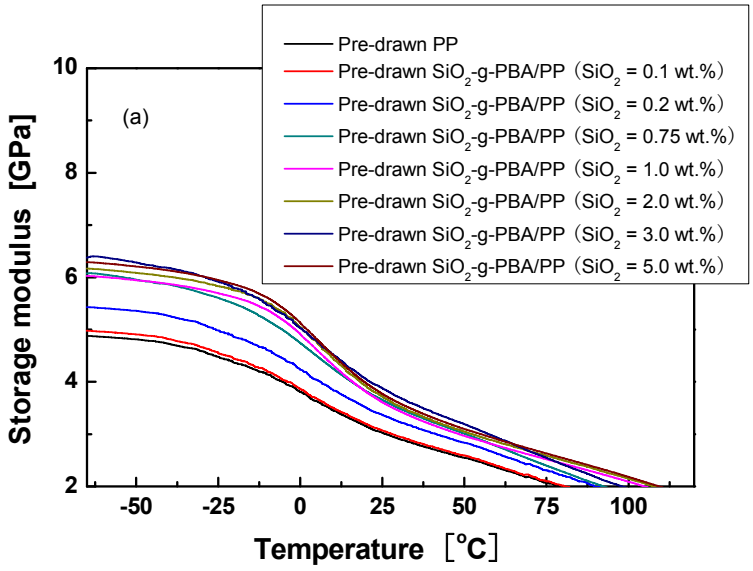


Fig. S2 WAXD crystallinity of PP and its nanocomposites with 1 wt.% nano-SiO_2 as a function of drawing ratio.



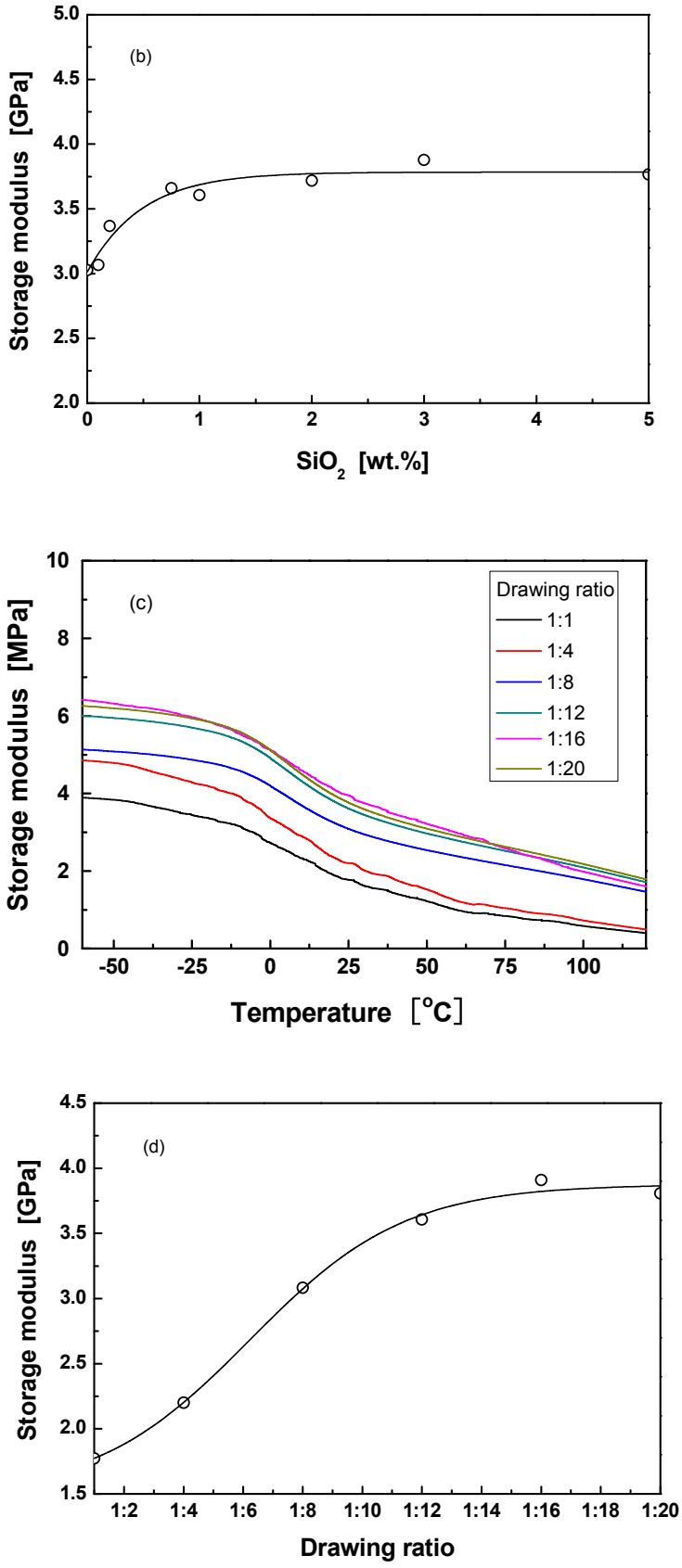


Fig. S3 Storage modulus of solid-state drawn PP and SiO_2-g-PBA/PP composites

measured by DMA under 1 Hz. (a) Effect of nano-SiO_2 content (drawing ratio = 12) on temperature dependence of storage modulus, (b) effect of nano-SiO_2 content (drawing ratio = 12) on storage modulus at 25 ºC, (c) effect of drawing ratio (content of nano-SiO_2 = 1 wt.%) on temperature dependence of storage modulus, and (d) effect of drawing ratio (content of nano-SiO_2 = 1 wt.%) on storage modulus at 25 ºC.

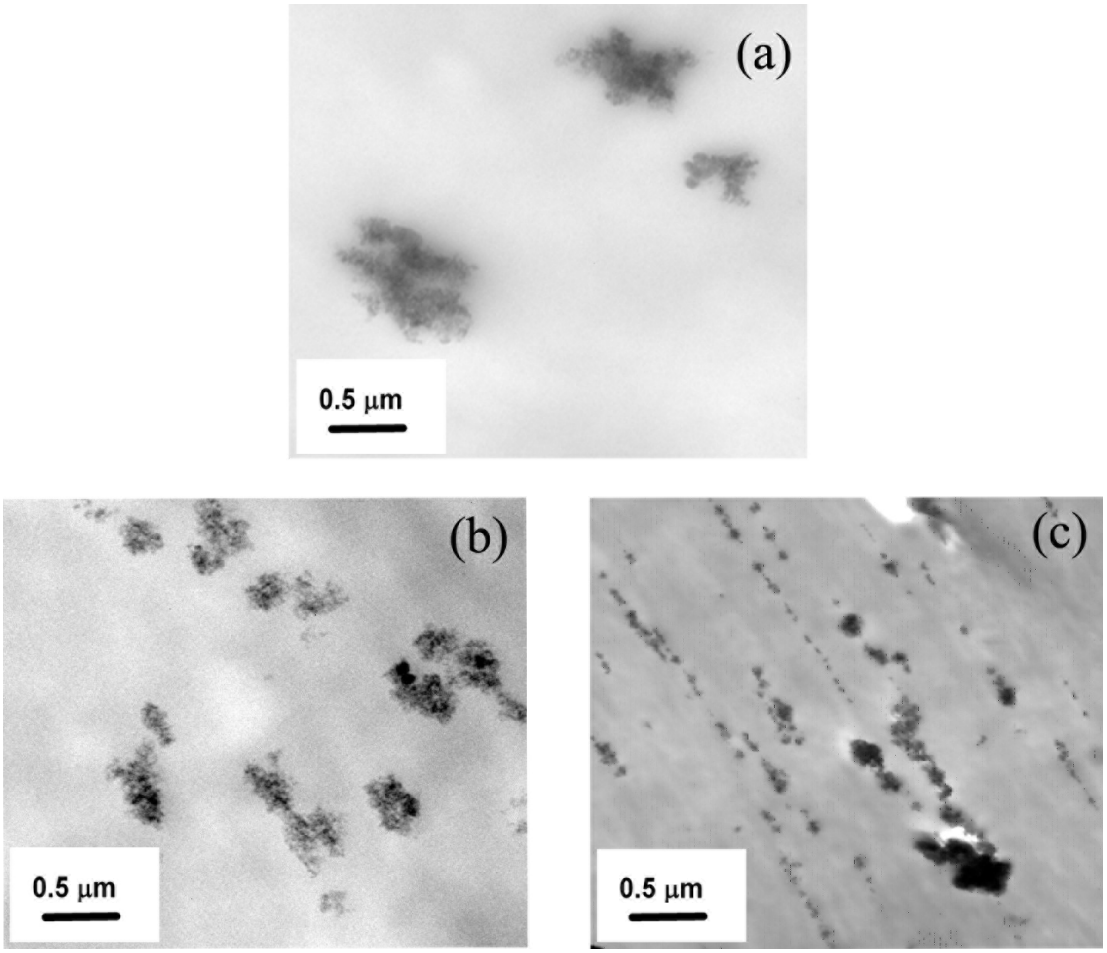


Fig. S4 TEM micrographs of (a) SiO_2-g-PBA/PP before compression molding, (b) undrawn SiO_2-g-PBA/PP after compression molding, and (c) oriented SiO_2-g-PBA/PP composite (drawing ratio = 12). Nano-SiO_2 content = 1 wt.%. After solid-state drawing, specific alignment of the grafted nanoparticles appears and size of the nanoparticles agglomeration is reduced because of the strong filler/matrix interaction.