Facile Construction Hybrid Polystyrene with a String of Lanterns Shape from Monovinyl–substituted POSS and Commercial Polystyrene via Friedel–Crafts Reaction and Its Properties

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Experimental

Synthesis of MVS

Trichlorovinylsilane (1.3 g, 8.0 mmol) was added to a solution of 1,3,5,7,9,11,14-Heptaisobutyltricyclo[7.3.3.15,11]heptasiloxane-endo-3,7,14-triol (iBu₇Si₇O₉(OH)₃) (5 g, 6.3 mmol) and triethylamine (3 ml, 21.5 mmol) in THF (100 ml) in an ice bath under an argon atmosphere. The mixture was stirred overnight and then filtered to remove the NEt₃·HCl precipitate. After almost complete evaporation of the volatile compounds, methanol was added to precipitate MVS, which was separated by filtration and dried under vacuum (5.0 g, 94%). ¹H NMR (300 MHz, CDCl₃): δ 6.02 (m, 3H), 1.86 (m, 7H), 0.97 (m, 42H), 0.61 ppm (m, 14H); ¹³C NMR (75 MHz, CDCl₃): δ 135.8, 129.9, 25.7, 23.9, 22.3 ppm; ²⁹Si NMR (60 MHz, CDCl₃): δ -67.4, -67.9 ppm; IR (KBr pellet cm⁻¹): 3069, 2950, 1606, 1112 cm⁻¹ (Fig. S10).
Fig. S1 EDX figures of PS and PS/POSS nanocomposites.
Fig. S2 $^{13}$C NMR figures of PS/POSS\textunderscore 15 (a) and model compound PS/POSS\textunderscore 100 (b and c).
Fig. S3 POM graphs of PS/POSS nanocomposites.

Fig. S4 SAXS figures of PS, POSS and PS/POSS nanocomposites.
Fig. S5 TEM image of PS.

Fig. S6 DLS figures of PS and PS/POSS nanocomposites.
Fig. S7 CA figures of PS, POSS and PS/POSS nanocomposites.
Fig. S8 Optical graphs of PS/POSS nanocomposites membrane.

Fig. S9 SEM images of PS/POSS nanocomposites.
Fig. S10 Characterization data of MVS ($^1$H NMR (a), $^{13}$C NMR (b), $^{29}$Si NMR (c) and FT-IR (d) spectra of MVS).