Cosolvent-free synthesis and characterisation of poly(phenyl-co-n-alkylsilsesquioxane) and poly(phenyl-co-vinylsilsesquioxane) glasses with low melting temperatures

Ryosuke Seto, a Kiyoshi Kanamura, a Satoshi Yoshida b and Koichi Kajihara a *

a Department of Applied Chemistry for Environment, Graduate School of Urban Environmental Sciences, Tokyo Metropolitan University, 1-1 Minami-Osawa, Hachioji, Tokyo 192-0397, Japan.
* E-mail: kkaji@tmu.ac.jp

b Department of Materials Science, School of Engineering, The University of Shiga Prefecture, 2500 Hassaka-cho, Hikone, Shiga 522-8533, Japan
Fig. S1 Magnified liquid-state $^1$H single-pulse NMR spectra of poly(Ph-co-R-SQ) with $R = \text{Me, Et, Pr, and Vi}$ (300 MHz, CDCl$_3$) normalized to the maximum value.
Fig. S2 Results of least-squares fitting of $^1$H NMR spectra shown in Figs. 3 and S1. Solid and dashed lines denote observed and simulated spectra, respectively, and dotted lines indicate spectra of decomposed peaks. Each peak was expressed by one or two pseudo-Voigt functions, and its intensity (area) was assumed to be proportional to the number of $^1$H nuclei attributed to the peak.
**Fig. S3** Full-width at half-maximum (FWHM) and centroid of peaks for alkyl and vinyl groups (top) and phenyl groups (bottom), evaluated by the peak fitting and decomposition of $^1$H NMR spectra shown in Fig. S2. Centroid is plotted as the shift from the peak position of corresponding trimethoxide (monomer).

**Fig. S4** Variation of average number of bridging oxygen atoms, $<m>$, with the fraction of R-SQ units, $f_R$, in poly(Ph-co-R-SQ).