Supporting information

Conversion of monomer

The extent of monomer conversion is measured with FT-IR before and after polymerization. Figure 1 shows the FT-IR spectra (a) monomer, (b) polymer, (c) and (d) nanocomposites. For the TMSPMA monomer, a characteristic C=C stretch vibration appears at 1638 cm^{-1} and an ester group vibration appears at 1720 cm^{-1}. After polymerization, both bulk poly(TMSPMA) and the nanocomposites display a broad and intense band between 3300 and 3700 cm^{-1} from the silanol Si-OH groups, which possibly results in adsorption of water molecules on the surface of the pore channels. A weak peak at 1633, 1640, 1641 cm^{-1} is probably related to residual C=C groups and water in the system. In addition, an extraction experiment exhibits no significant weight loss for the samples, indicating a complete polymerization. Thus, the peak in the range of 1633-1641 cm^{-1} is probably due to water. However, the bulk polymer and nanocomposites were synthesized under the same conditions (initiator concentration, temperature, and time), so it is reasonable to compare their mechanical properties and thermal stability.

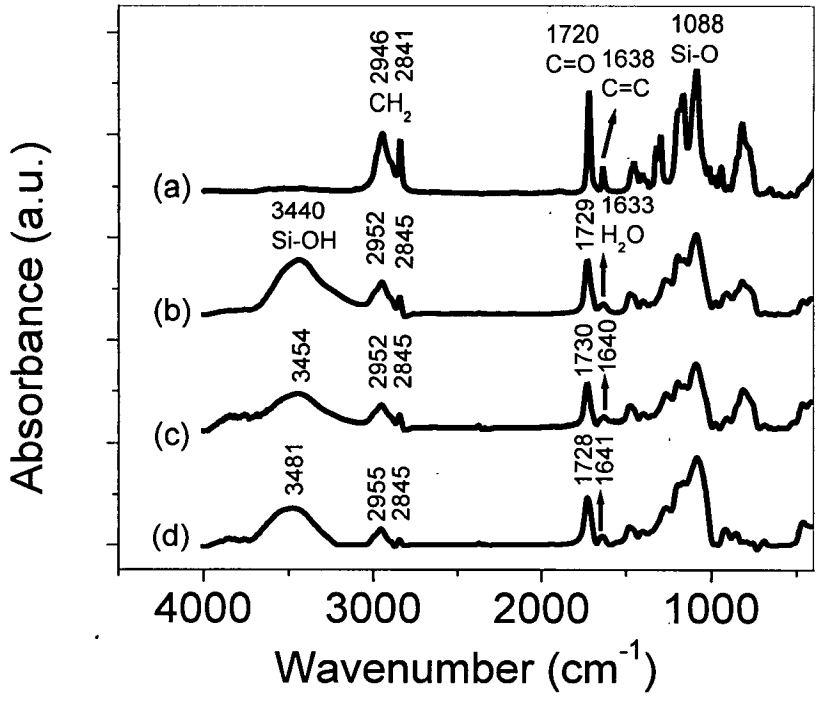

Figure 1. FT-IR spectra (a) TMSPMA, (b) poly(TMSPMA), (c) nanocomposite with 8.4 wt% silica particles, (d) nanocomposite with 28.2 wt% silica particles.