Supporting Information

Materials and methods

Preparation of the layered mesostructured materials (LMS)

In a typical preparation, 9.00 g of surfactant (oleyldimethylbenzylammonium chloride, 38.4 % or ammonyx KP, Stepan) was first mixed with 25.00 g of 2 mol/L NaOH and 193.10 g of distilled water under stirring. To this homogeneous solution, 19.25 g of tetraethylorthosilicate solution (TEOS, Aldrich) was added with vigorous stirring for 24 h at room temperature. The resulting product was washed thoroughly with hot deionised water (about 80 °C) to remove the excess of surfactant and dried at room temperature.

Preparation of the polymer nanocomposite (PNC) materials

Prior to the polymer nanocomposite preparation, the neat PP-g-MA and the layered mesostructured silica (LMS) material were dried overnight in a vacuum oven at 70 °C. The LMS nanoparticles were then melt-blended by 5 parts per hundred (phr) in the PP-g-MA polymer matrix using a Haake-Buchler batch mixer (RHEOCORD SYSTEM 40) at 180 °C and 60 rpm for 30 min.

Characterization of PNCs and LMS

The structure of LMS nanoparticles and PNCs was assessed by XRD (X-ray-diffraction) and TEM (Transmission electron microscopy) analyses. XRD patterns were obtained with a powder diffractometer Siemens D5000 using CuKα radiation (λ = 1.54184 Å) over 2 θ ranges from 1° to 10°. TEM observations were carried out using a H-9000NAR-Hitachi microscope operated at 300kV. The samples for TEM observations were ultramicrotomed at room temperature using a diamond knife and deposited on silicon monoxide support for getting a high resolution images.