Supplementary Material (ESI) for Journal of Materials Chemistry

Cross-linked polyethylene@silica:
The first full interpenetrating network hybrid particles

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Supplementary Information

Analytical instrumetation

Thermoporosimetry

See main text.

Solid state NMR

Measurements were performed on a Bruker AVANCE 300 spectrometer at $B_0 = 7$ T with $n_0(^1H) = 300.13$ MHz, $n_0(^{13}C) = 75.47$ MHz and $n_0(^{29}Si) = 59.63$ MHz, using a 4 mm triple resonance Bruker MAS probe. Samples were spun at the magic angle using ZrO_2 rotors (10 kHz). ^{29}Si and ^{13}C MAS NMR spectra were recorded with high-power $\{^1H\}$ decoupling (≈ 50 KHz) during acquisition, using 90° pulse and 100-s recycle delays. ^1H spectra were obtained with 90° pulse duration and 3-s recycle delays. For CP experiments under MAS, the radio frequency field strength for ^1H was ca. 50 kHz. ^1H and ^{29}Si chemical shifts were referenced to TMS.

Microscopy

High-resolution scanning electron microscopy (HR-SEM) observations were performed with a Sirion (FEI) microscope, operating at 5 kV. Samples were prepared by placing the centrifuged, air-dried powder on an aluminum stub for SEM using a double-sided carbon tape.

Particle Size Analysis

The diameter of at least 150 particles was determined by Analysis software equipped in HR-SEM. The statistical analysis was conducted using Origin software.

Surface Area and Porosity Analysis

BET specific surface area and BJH pore diameters were calculated from nitrogen adsorption/desorption isotherms determined at 77K using Micromeritics ASAP 2020 surface area analyzer.

Thermal gravimetric analysis (TGA)

These analyses were carried out with an SDTA 851^e (Mettler Toledo) apparatus under air at rate 10 °C/min using STAR^e software.

Zeta-potential

These measurements were carried out using Zetasizer Nanoseries by Malvern Instruments: The precipitate obtained by centrifugation of the emulsion was re-dispersed in 10 mM NaCl and injected into a cuvette.