

Supplementary Information

for

Facile Preparation of Porous Polymeric Composite Monoliths with Superior Performances in Oil/Water Separation – A Low-molecular Mass Gelators-based Gel Emulsion Approach

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1. Stability of Gel Emulsions

1.1 Influence of the nature of water insoluble monomers and the volume fraction of the dispersed phase (water) to the stability of a given gel emulsion (stabilizer, 2%, w/v, of the organic phase)

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1. Stability of Gel Emulsions

Table S1 Influence of the nature of water insoluble monomers and the volume fraction of the dispersed phase (water) to the stability of a given gelemulsion (stabilizer, 2%, w/v, of the organic phase)

	MMA	<i>t</i>-BMA	St
80 %	10 h	48 h	4 h
85 %	1 h	4 h	30 min
90 %	35 min	50 min	15 min
95 %	25 min	25 min	10 min

2. Pore Structures

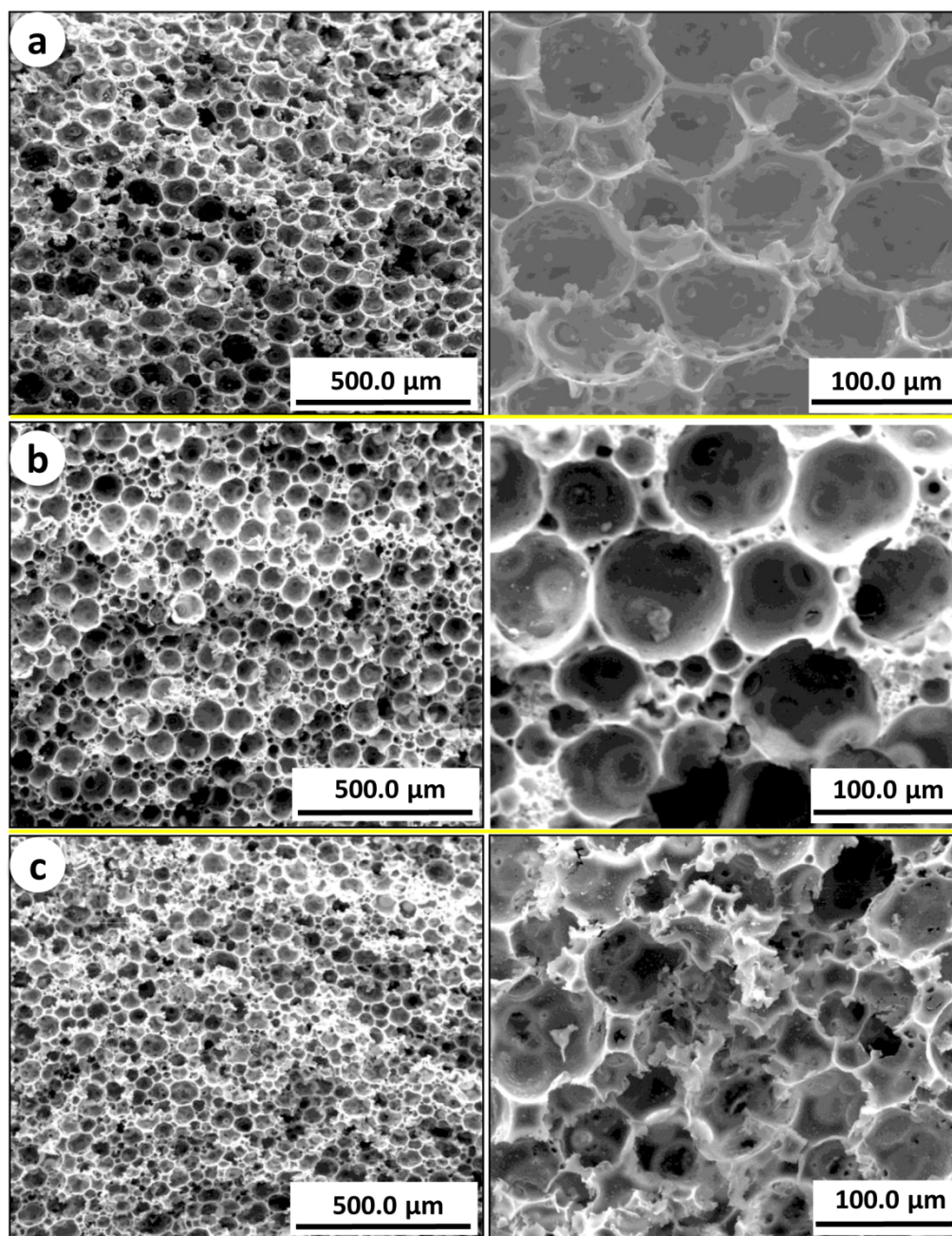


Fig. S1 SEM images of the porous polymeric monoliths prepared from gel emulsions containing different amount of the stabilizer (w/v): (a) 1%; (b) 2%; (c) 3%.

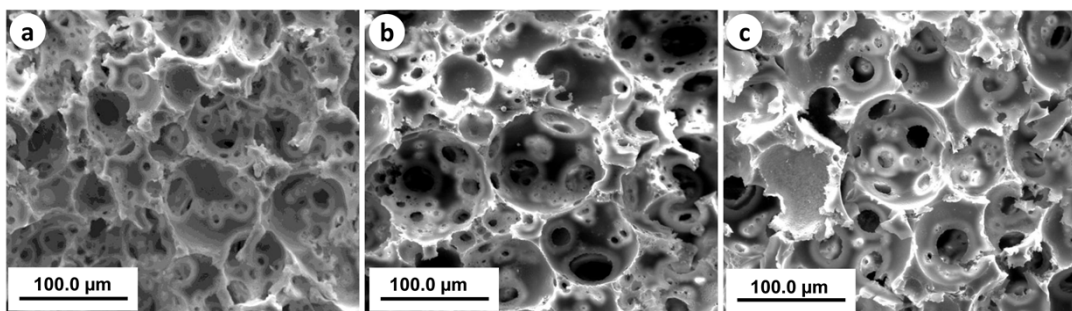


Fig. S2 SEM images of the porous polymeric monoliths prepared with different concentrations of the cross-linker, DVB: (a) 5%, (b) 10%, (c) 15%.

3. Thermo-analysis of Porous Materials and SEM/TEM Studies of the Residues

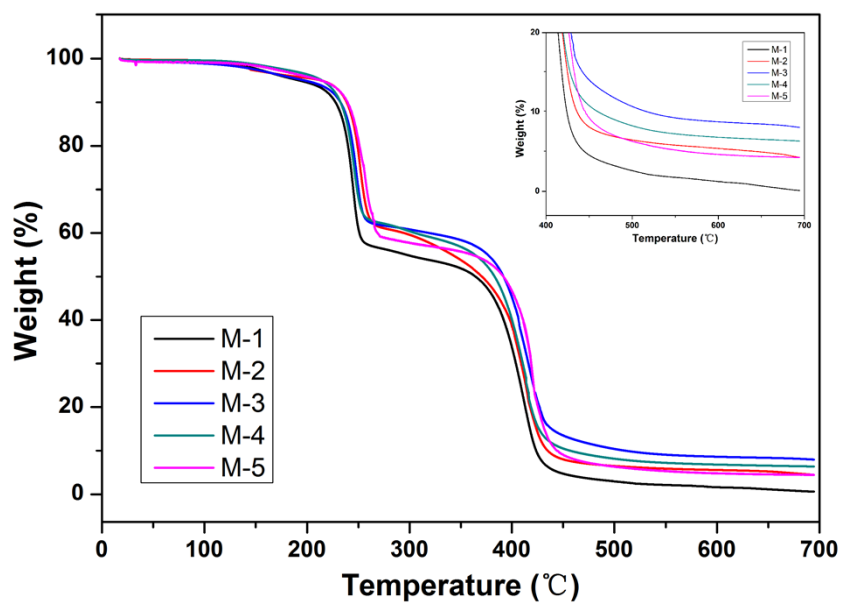


Fig. S3 TGA curves of M-1 (black line), M-2 (red line), M-3 (blue line), M-4 (green line), and M-5 (pink line) under oxygen flow.

As for evidence for the assumption that the inorganic oxide as produced should have deposited within the polymeric materials, SEM measurements with EDS analysis and TEM observation were conducted with M-5 as example sample. Some typical results are shown below.

For the sample, in average silicon content on the internal surface of the sample (Fig. S4a and S4b) is 1.41 wt% or 0.64% (atom number), and that in the internal of the materials (Fig. S4c and S4d), the content is 2.35 wt% or 1.06% (atom number). Clearly, the amount of silicon deposited in the internal of the materials is much more than that deposited on the surface of them.

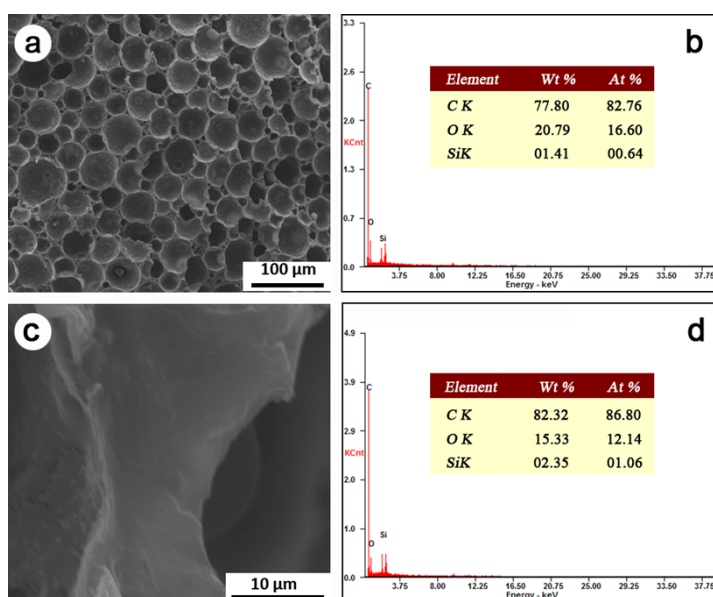


Fig. S4 SEM images with EDS analysis results of M-5.

As for the shape and size of the inorganic oxide in the porous materials, again, we used M-4 as an example sample and have tried to conduct TEM measurement of the original materials, but unfortunately, we failed due to difficult in preparation of the TEM samples (the porous materials are too hydrophobic that prevents infiltration of epoxy resin into them). However, residues from TGA analysis which was conducted under oxygen atmosphere possess irregular ball-like shapes, which may be aggregates of even smaller silica particles, as revealed by SEM and TEM measurements (c.f. Figure S4), and the sizes of them could be from a few nano-meters to more than a few micro-meters. Corresponding modifications have been made.

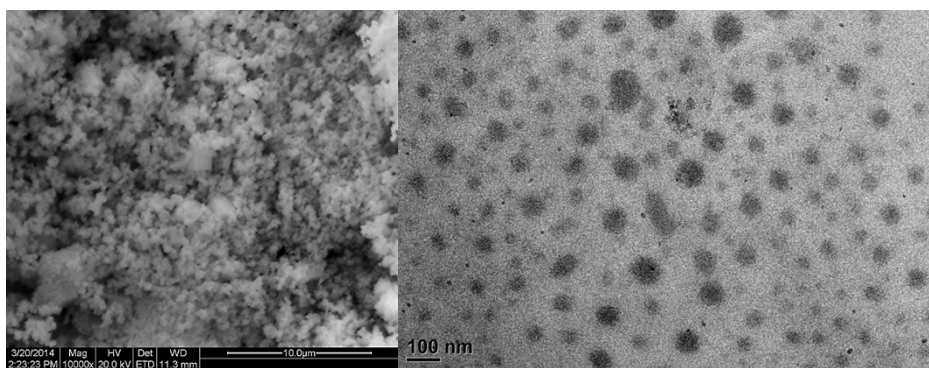


Fig. S5 The SEM and TEM images (a, b) of the incinerated residues of M-5 after TGA analysis under oxygen flow.

4. Calculation of the Theoretical Porosities

Theoretical values of the porosities (Φ) of the materials have been calculated by 1) measuring their total volume (V), 2) weighing their weight (W), 3) measuring the weight of “silica” in the materials (W_1), and then 4) using equation of $\Phi = [V - W_1/\rho_2 - (W - W_1)/\rho_1]/V$, where ρ_1 and ρ_2 are the density of the polymeric materials and that of silicon oxide. It is to be noted that the density of the monomer of the polymer in liquid state at 20 °C and that of silica were adopted as approximate values of the organic part and inorganic part of the materials, respectively.

Table S2 Theoretical values of the porosities of the porous materials.

Porous Monoliths	Porosities (Φ)	Total Volume (V)	Total Mass (W)	Density of Polymeric Materials (ρ_1)*	Silane (W_1)**	Silane (ρ_2)
M-1	0.79	1 cm ³	0.21 g	0.9875 g/cm ³	~	~
M-2	0.71	1 cm ³	0.29 g	0.9875 g/cm ³	0.0095 g	0.9460 g/cm ³
M-3	0.88	1 cm ³	0.12 g	0.9875 g/cm ³	0.0100 g	0.9990 g/cm ³
M-4	0.83	1 cm ³	0.17 g	0.9875 g/cm ³	0.0087 g	0.8690 g/cm ³
M-5	0.77	1 cm ³	0.23 g	0.9875 g/cm ³	0.0094 g	0.9356 g/cm ³

* $\rho_{(t\text{-BMA})} = 0.8940 \text{ g/cm}^3$, $V_{(t\text{-BMA})} = 180 \text{ }\mu\text{L} = 0.18 \text{ cm}^3$, $m_{(t\text{-BMA})} = 0.1788 \text{ g}$; $\rho_{(\text{DVB})} = 0.9325 \text{ g/cm}^3$, $V_{(\text{DVB})} = 20 \text{ }\mu\text{L} = 0.02 \text{ cm}^3$, $m_{(\text{DVB})} = 0.0187 \text{ g}$; $\rho_1 \approx (m_{(t\text{-BMA})} + m_{(\text{DVB})}) / (V_{(t\text{-BMA})} + V_{(\text{DVB})}) = 0.9875 \text{ g/cm}^3$

** $V_{(\text{silane})} = 10 \text{ }\mu\text{L}$; $W_1 = \rho_2 \cdot V_{(\text{silane})}$

5. Videos of Selective Absorption

Video S1. Selective absorption of kerosene from water by using **M-3** as an absorbent (see files attached).

Video S2. Selective absorption of THF from water by using **M-3** as an absorbent (see files attached)