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- Supplementary information -

About the Unusual Self-Assembly of New Methylzinc-Poly(Ethylene Glycol) Amphiphiles and their Application for Materials Synthesis

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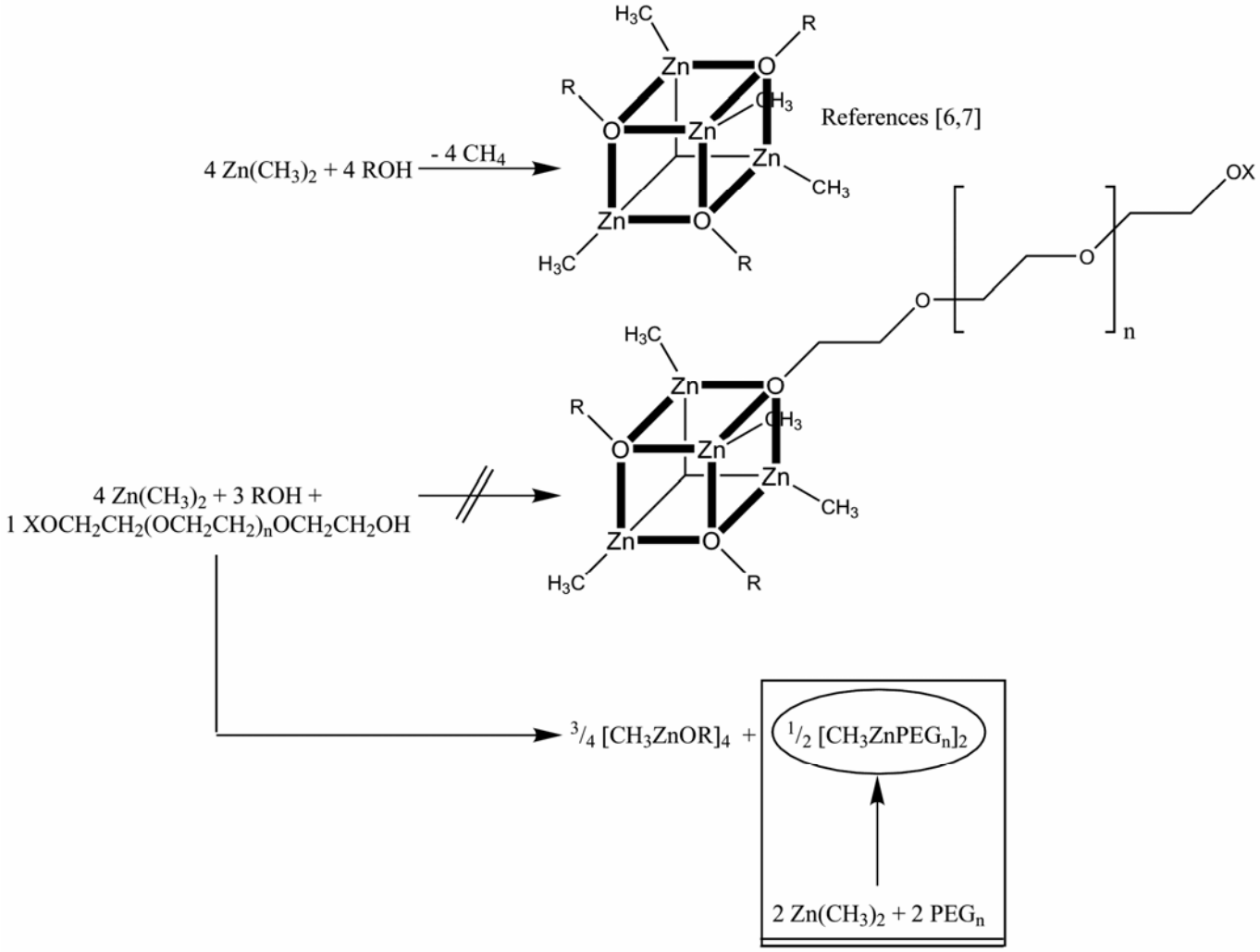
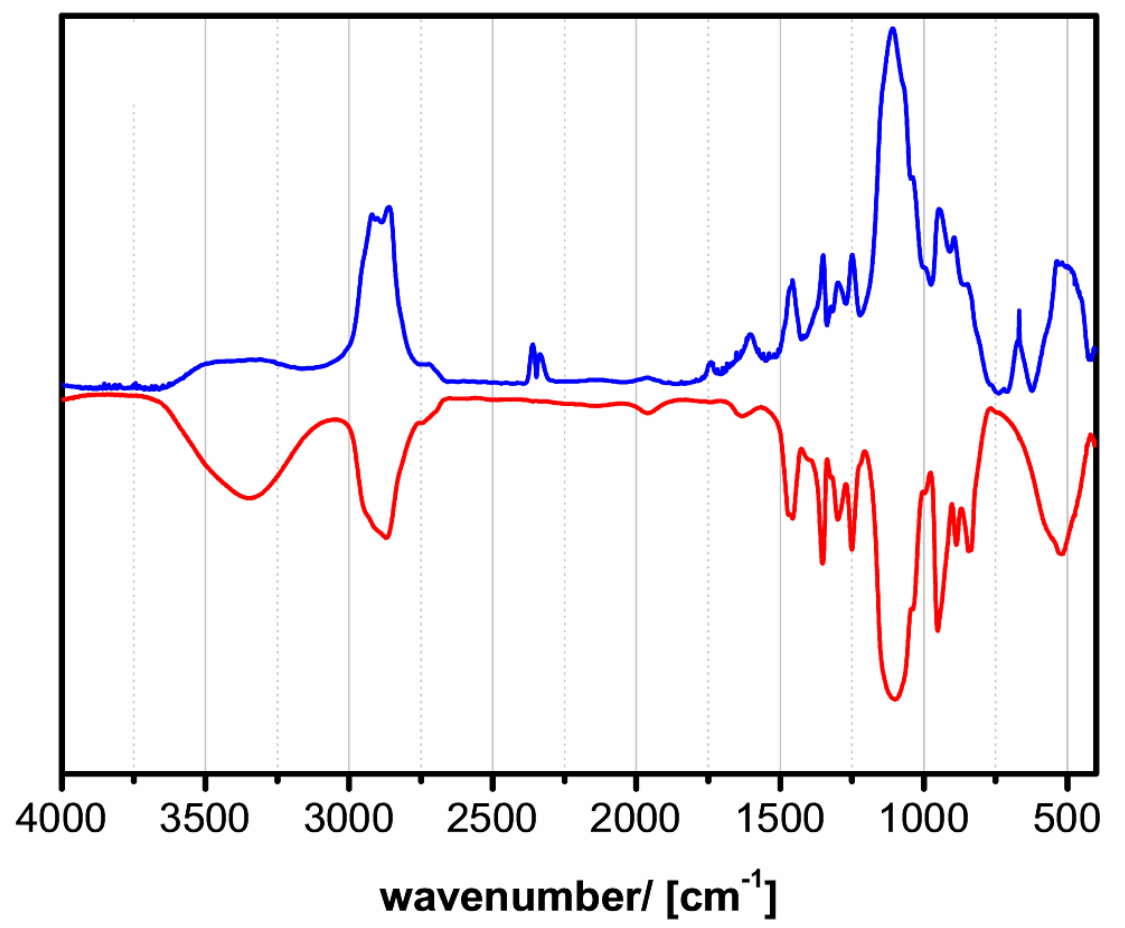
Supplementary information

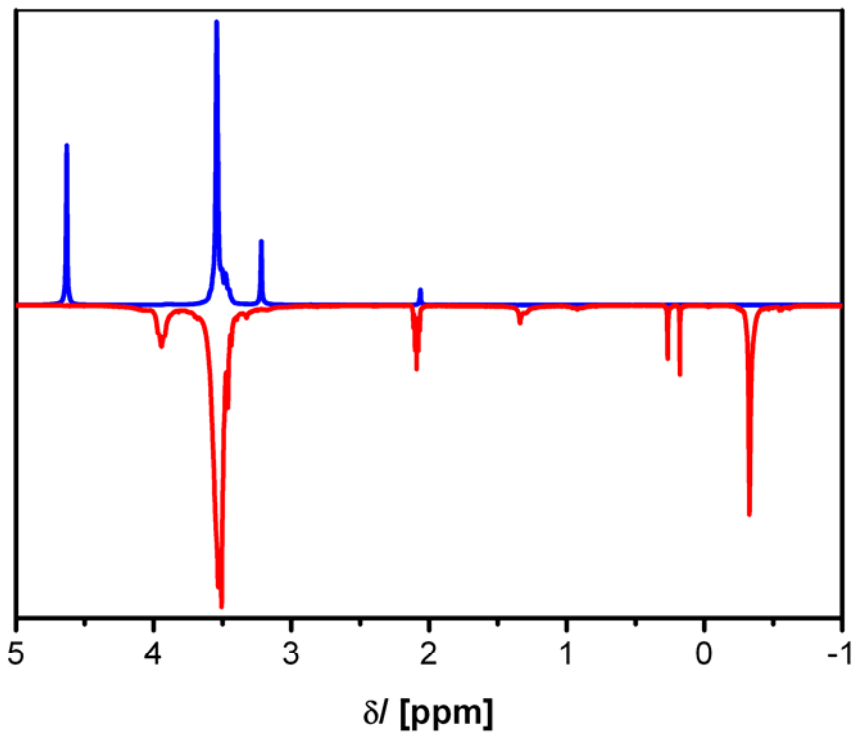
SI-1: Reaction scheme.



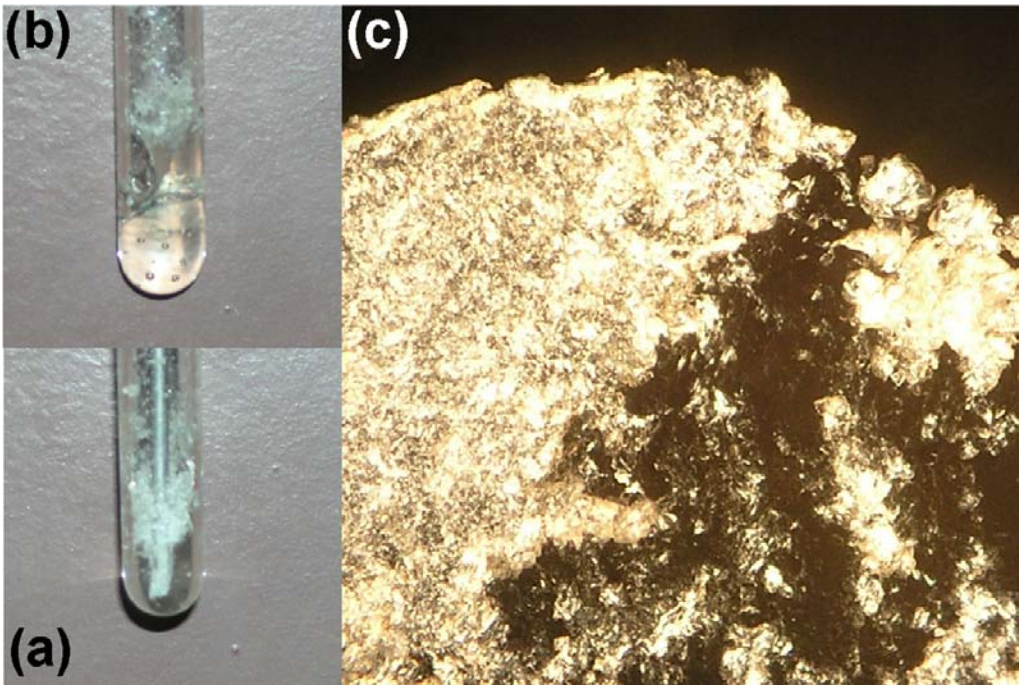
SI-2: FT-IR spectra of the pure PEG400 as a reference (red) and of the dried [MeZnOPEG400]-gel (blue; for better comparison mirrored at the x-axis).



SI-3: ^{1}H-NMR spectra of PEG_{400}-OMe (blue) as a reference and [MeZn-$OPEG_{400}OMe$] (red) in deuterated toluene as a solvent.(for better comparison mirrored at the x-axis).



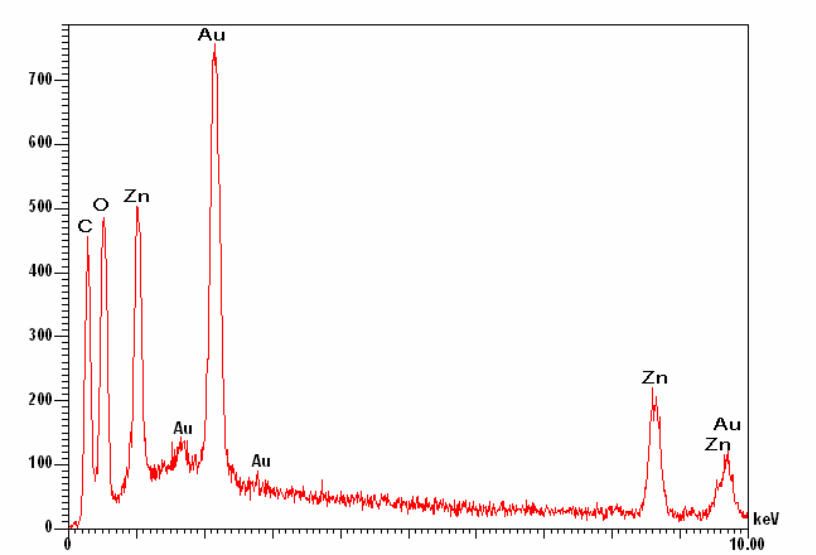
SI-4: Polarization microscopy and mechanical properties of the [MeZnOPEG$_n$]-gels:



Photographic images of a dried [MeZnOPEG$_n$]-gel mechanically disrupted by a syringe needle (a) and self-reparing after 24h storage (b). (c) shows the material between crossed polarizers indicating the strong birefringence.

It is worth mentioning that while PEG$_{400}$ (as well as PEG$_{200}$) is a liquid at RT, the vacuum-dried [MeZn-OPEG$_n$] materials possess glass-like characteristics (Fig. SI3a,b). The gel is relatively hard but it can be disrupted for instance by a syringe needle as shown in Fig. 3a. While the crack-morphology is characteristic for a solid-material, during 24h the crack has disappeared and one obtains a homogeneous, transparent gel (again).

SI-5: EDX-spectra of the supercritically dried [MeZnOPEG$_{400}$]-gel.



Accelerating voltage (kV)	*20.0*
Beam current (nA)	*500.0*
Magnification	*50*
Live time	*100*
Preset Time (s)	*1000*
Nb Channels	*2048*
Ev / Channel	*10*
Offset (keV)	*0*
Width (keV)	*20*

The spectrum shows signals for carbon, oxygen and zinc belonging to the [MeZnOPEG$_n$]-gel. The signal for gold is caused by the gold-sputtering used for the preparation of the SEM sample.

SI-6: DLS-measurements (particle size distribution function) of the initial suspensions of the [MeZnOPEG$_{400}$] synthesis.

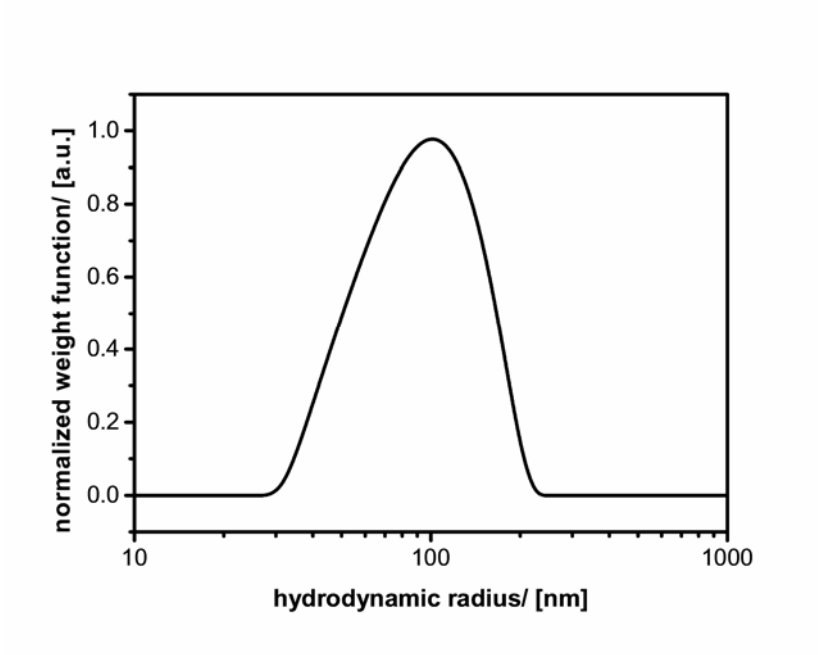
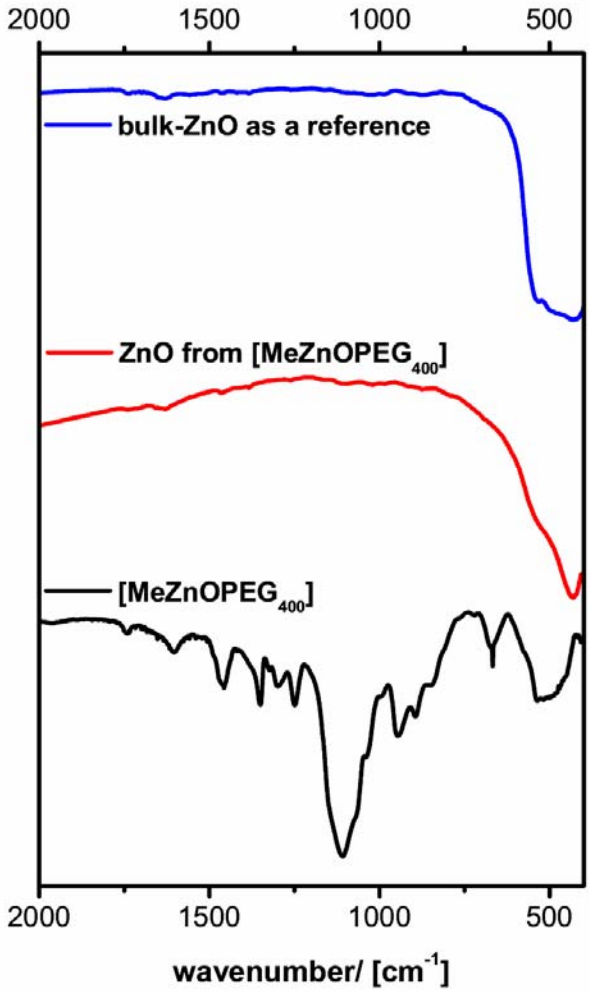


Figure SI-7: FT-IR spectra for the preparation of ZnO from [MeZnOPEG$_{400}$].



By comparison to the spectrum of bulk ZnO as a reference, it can be seen that also from [MeZnOPEG$_n$] pure ZnO can be obtained.

Fig. SI-8: TGA-data.

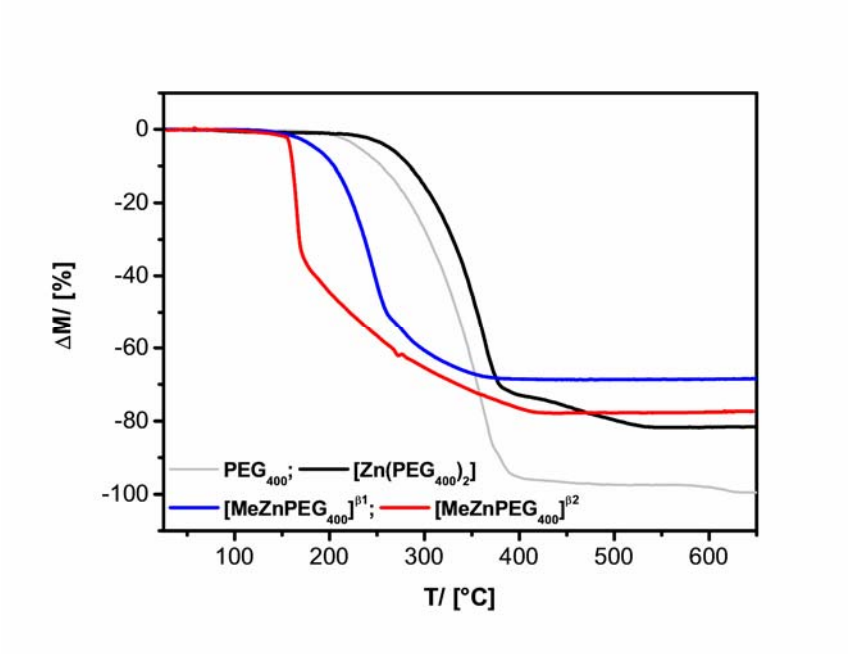
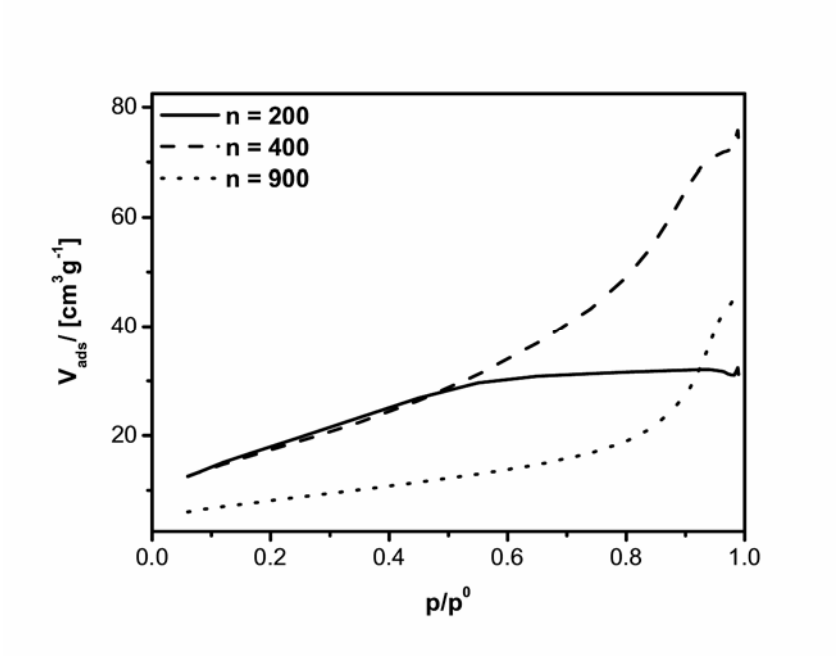


Figure SI-9: Isotherms (adsorption branches) from N_2 physisorption measurements of three mesoporous ZnO materials derived from [MeZnOPEG$_n$]-gels with different PEG-length.



SI-8 Analytic techniques:

Thermogravimetric analysis of the precursor was carried out with a thermogravimetric setup from Rubotherm. X-ray diffractograms were recorded with a Bruker - AXS D8 Advance using CuK_{α}- radiation (λ = 1.5418 Å) and a position-sensitive-detector (PSD) diffractometer using CuKα radiation in the 2θ range from 25° to 85° with 0.015° step. Conventional transmission electron microscopy (CTEM) was performed on a JEOL JSEM 200B microscope and a Zeiss EM 912Ω at an acceleration voltage of 120 kV. SEM images were acquired using an Hitachi S-4000 microscope equipped with an SAMX EDX detector. FT-IR spectra were recorded using a Bruker Vector 22 spectrometer from KBr pellets. UV/Vis spectra were recorded using a Perkin Elmer Lambda 20 spectrometer equipped with a reflecting sphere, Labsphere RSA-PE-20. Small-angle x-ray scattering (SAXS) measurements were conducted with a Nonius rotating anode (P = 4 kW, CuKα) and an image-plate detector system. With the image plates placed at a distance of 40 cm from the sample, a scattering vector range from s = 0.05 – 1.6 nm^{-1} was available. The samples were irradiated for 18 h to reduce the noise level and to obtain a sufficiently high scattering intensity. 2d diffraction patterns were transformed into a 1d radial average of the scattering intensity. N_2-physisorptions measurements were recorded on a Micromeritics Gemini. Dynamic light scattering was performed with an instrument from Viscotek Model 802. NMR-spectra were acquired on a Bruker Avance DPX 250 spectrometer using dried C_6D_6 as a solvent. Solid-State NMR spectra were recorded using a Bruker DRX 400 spectrometer. The following experimental parameters were used for the measurements. We used a cross-polarization pulse program, a spin rate of 5kHz, 5s recycle delay, 2ms contact time, π/2 pulse width of 6.2 μs. Optical microscopy was performed using an Olympus CX41.