nanomaterials

MDPI

Supplementary materials

Solvent-induced assembly of one-patch silica nanoparticles into robust clusters, wormlike chains and bilayers

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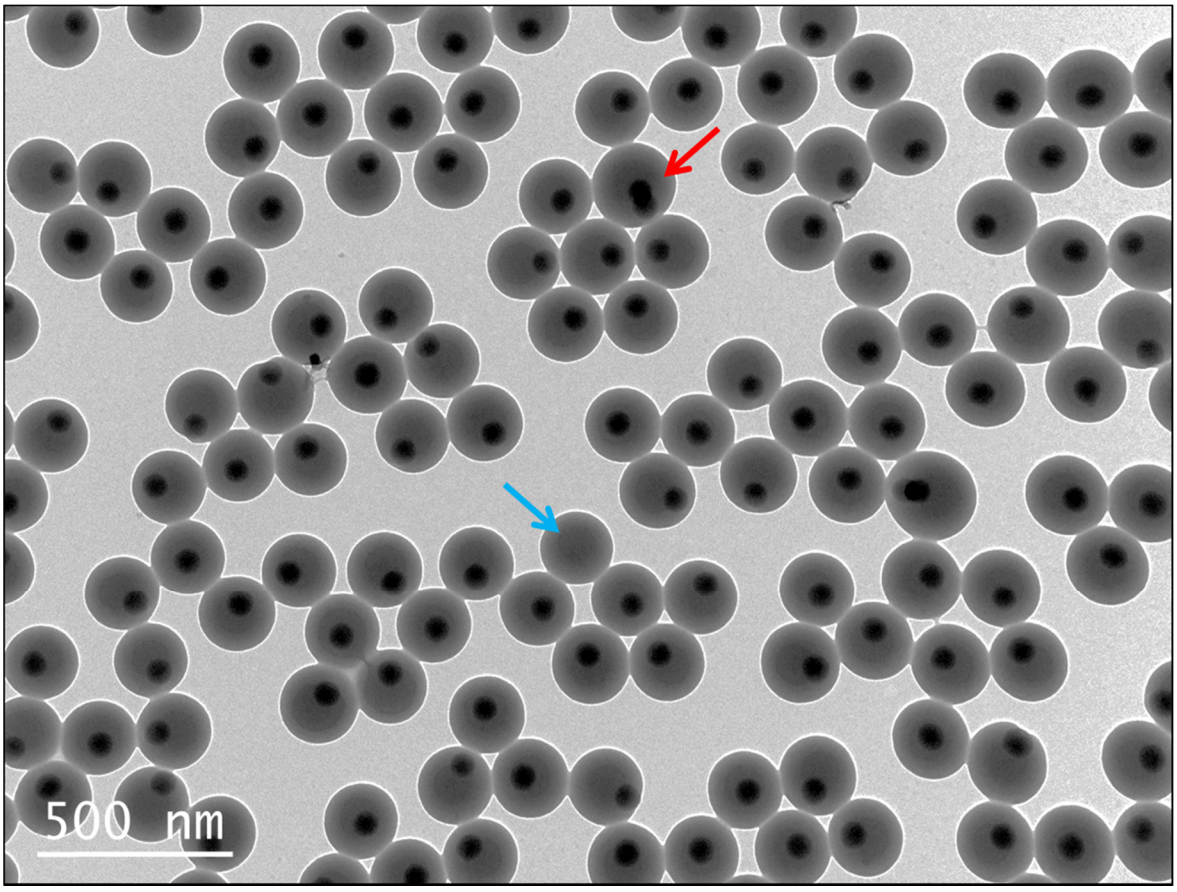


Figure S1. Representative TEM image of silica/PS monopod-like nanoparticles as obtained by emulsion polymerization of styrene in the presence of 60-nm silica seeds previously surface-modified with MMS at the nominal grafting surface density of 1 funct./nm^2. Both arrows evidence the presence of side-products: PS particle with two silica seeds (red arrow) and PS particle without any silica seed (blue arrow, without any consequence on the yield of the forthcoming synthesis of one-patch silica particles because of the PS dissolution stage). The measured morphology yield is 98 % with regard to the silica seeds.

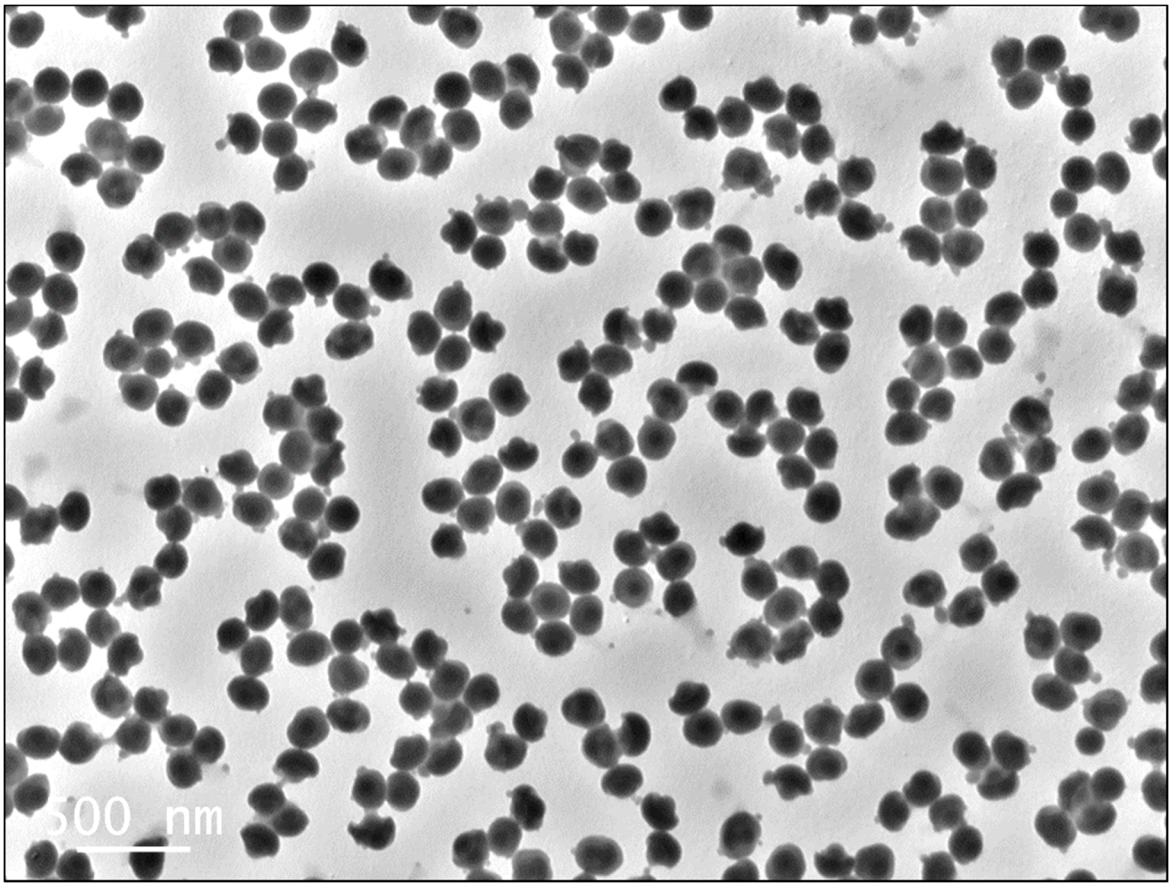


Figure S2. Representative low magnification TEM image of 145-nm silica particles with a single 100-nm PS patch (S = 0.69). Smaller particles are residual PS nanoparticles resulting from incomplete washing after dissolution in THF.

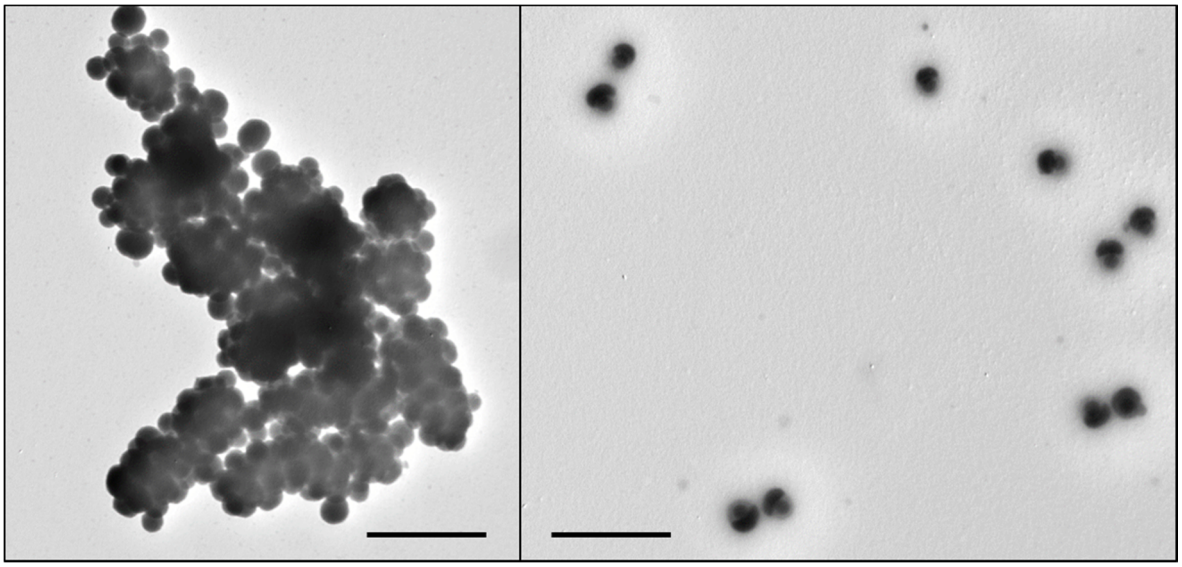


Figure S3. Representative TEM images of micelles obtained from 115-nm silica particles (S = 0.87) as obtained in a few days in equivolume THF/ethanol mixture (left) before and (right) 10 min after the addition of an additional quantity of THF to lower the ethanol fraction to 20 vol%. Scale bars: 500 nm.

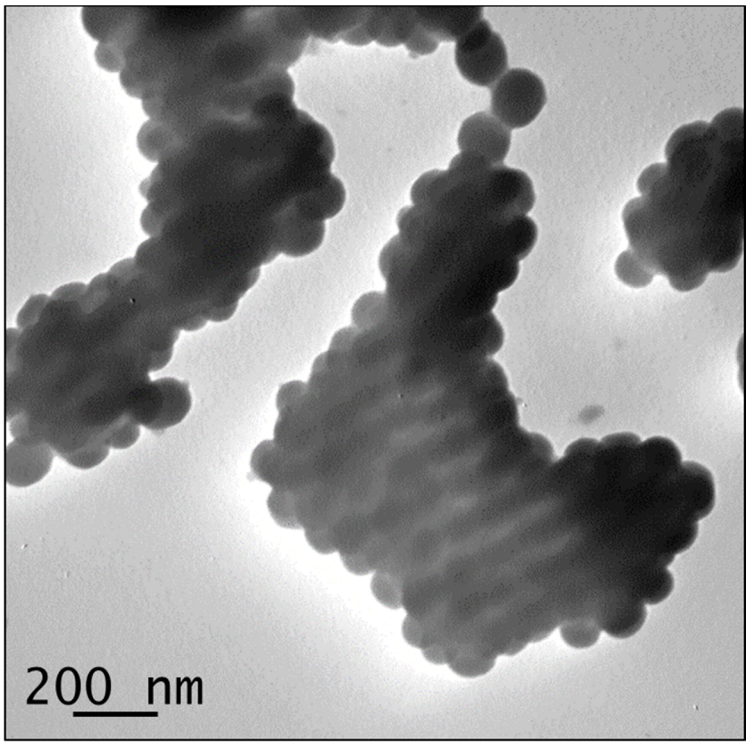


Figure S4. Representative TEM image of bilayers obtained from 85-nm silica particles (S = 1.18) after 90 min of incubation in equivolume THF/ethanol mixture under ultrasounds (Ultrasonic cleaning bath Fisherbrand™ FB15051 used at room temperature).

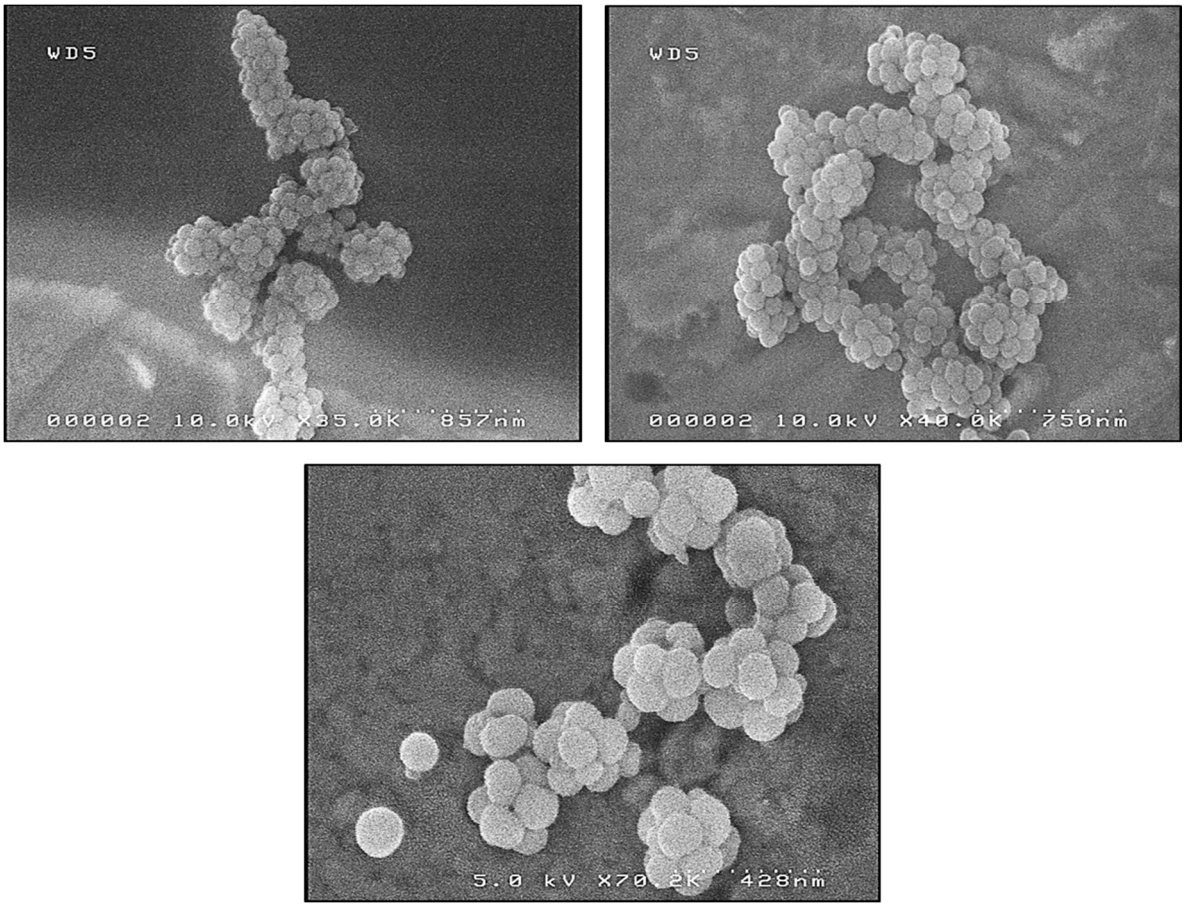


Figure S5. Representative scanning electron microscopy (SEM) images of the silica particles present in the incubation medium after 5 days. **Top:** spherical micelles and wormlike chains obtained from silica monomers with S = 0.87. **Bottom:** large clusters and spherical micelles obtained from silica monomers with S = 0.69. SEM images were obtained on Hitachi S-4500 microscope operating at 10 kV. Before analysis, samples deposited on a 300-mesh carbon coated copper grid, were coated with nm-thick layer of gold and palladium (10 %) with a SC7620 mini sputter coater.

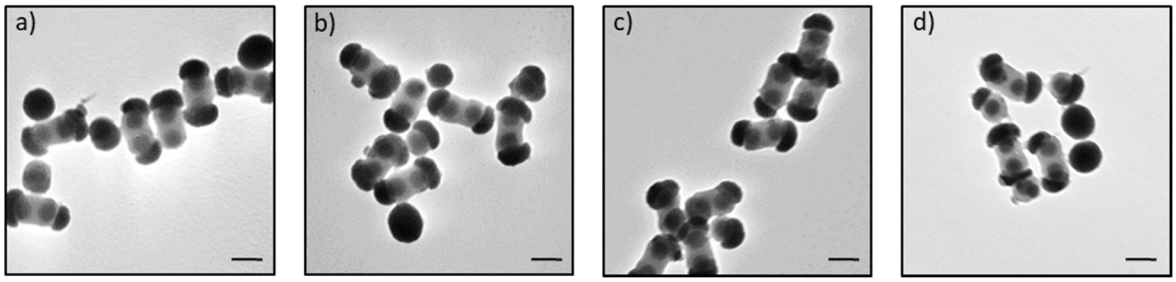


Figure S6. Representative TEM images of the silica dimers obtained from 85-nm silica particles (S = 1.18) after 3 h of incubation in equivolume THF/ethanol mixture at room temperature on a roller mixer, and after being diluted 20 times in ethanol and stored at 4°C for **a)** 20 h, **b)** 7 days, **c)** 32 days, and **d)** 52 days. Scale bars: 100 nm. This experiment shows that excess ethanol freezes the structure of the assemblies and preserves them over long periods.