Electronic Supplementary Information (ESI)

Synthesis of CdS nanoparticles in switchable surfactant reverse micelles

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Experimental Procedures

1.1. Materials

N,N-Dimethylacetamide dimethyl acetal (90%) and dodecylamine (97%) were purchased from TCI. Hexadecyltrimethylammonium bromide (CTAB 99%), hexamethyldisilathiane (97%), hexanol (99%), heptane (99%), 1-dodecanethiol (99%), and cadmium nitrate (99%) were purchased from Sigma-Aldrich. N'-dodecyl-N,N-dimethylacetamidinium bicarbonate was synthesized as literature[1].

1.2. Synthesis of CdS nanoparticles in switchable surfactant reverse micelles

N'-dodecyl-N,N-dimethylacetamidinium bicarbonate (0.1g) and *n*-hexanol (0.3g) were dissolved in heptane (2.7g). Hexamethyldisilathiane (10μL) was added into the solution and the mixture was stirred. A cadmium nitrate aqueous solutions (10μL, 0.1M) was then added into the solution with sonication for 10 min. The reverse micelle was then magnetic stirred at room temperature for 12 h. After the CdS nanoparticles we're synthesized, 1-2 drops of 1-dodecanethiol were added into the micelle. The micelle was broken by bubbling of N_2 gas through the mixture at 65°C for 30 min. The yellow product was separated from the solution by centrifugation (12000 r/min). CdS NPs were washed by acetone and ethanol 2-3 times.

1.3. Characterizations

The fourier transform infrared spectrometer (FTIR) spectra were recorded by a ABB MB-104 instrument with a resolution of 4 cm^{-1} over the frequency range of 400-4000 cm^{-1}. The CdS nanoparticles were redispersed in ethanol, which then dried on a KBr slice for FTIR measurements. Transmission electron microscopy (TEM) images and selected-area electron diffraction (SAED) patterns were obtained on a TEM (JEOL JEM-2100) at an acceleration voltage of 200 kV. The CdS nanoparticles were air-dried on a carbon-coated copper grid for TEM measurements. UV-vis absorption spectra of the CdS nanoparticles dispersions were recorded on a Shimadzu UV-3101PC UV-Vis spectrometer. The solid products were subjected to a powder X-ray diffraction (XRD) analyzer (Bruker D8 Advance) with Cu Kα radiation at a scanning rate of 8°/min in the 2θ range from 5 to 80°.

References

1 Y. Liu, P. G. Jessop, M. Cunningham, C. A. Eckert, C. L. Liotta, *Science*. 2006, **313**, 958.

2 B. A. Harruff, C. E. Bunker. *Langmuir* 2003**, 19**, 893.