Electronic Supplementary Information (ESI)

A pH Switchable Pickering Emulsion Stabilised by Controlled Nonconventional Lanthanum Sulfide Nanoparticles, in situ Hydrophobized with Cationic Surfactant

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Supplementary Material: Tables

Table S1: Comprehensive details on the development of W/O microemulsions.

Toluene was added to a dry beaker with water and a surfactant (Tween 80) in a predetermined [Water]/[Surfactant] ratio ($W_0 = 10$). The mixture was then placed in a digital ultrasonic cleaner and sonicated for 30 seconds. To get the best clarity, 1-butanol was then gradually added to the turbid and viscous solution while stirring continuously. The system was given adequate time to reach equilibrium; after turbidity disappeared, it was not restored. It was determined that the amount 1-butanol would be required to produce a stable microemulsion. The entire process was carried out at a constant temperature of 303 K. As a result, the following table displays the volume percentages of toluene, water, surfactants, and 1-butanol for the reverse micellar media:

W/O microemulsion media	Toluene (%)	Water (%)	Tween 80 (%)	1-butanol (%)
Tween 80/1-butanol/toluene/water	55.23	1.10	7.21	36.45

Supplementary Material: Figures





Fig. S1. PXRD patterns of lanthanum sulfide nanospheres (synthesised from microemulsion, Tween 80/1-butanol/Toluene/lanthanum sulfide) at room temperature.

Fig. S2



Fig. S2. IR spectrum of lanthanum sulfide nanospheres (synthesised from microemulsion, Tween 80/1-butanol/Toluene/lanthanum sulfide) at room temperatures.

Fig. S3



Fig. S3. TGA curve of lanthanum sulfide nanospheres (synthesised from microemulsion, Tween 80/1-butanol/Toluene/lanthanum sulfide) at room temperatures.

Fig. S4



Fig. S4. Digital photographs of Pickering emulsion produced by lanthanum sulfide nanoparticles of different wt.% after (a) 1 h and (b) 24 h. Optical micrographs of Pickering emulsion produced with 0.05 wt.% lanthanum sulfide nanoparticles after (c) 1 h and (d) 24 h.





Fig. S5. Zeta potential of 0.05 wt.% lanthanum sulfide nanoparticles in water as a function of pH.

Fig. S6



Fig. S6. Optical micrographs of Pickering emulsion produced with 0.05 wt.% lanthanum sulfide nanoparticles with CTAB of concentration of (a) 0.3 mM and (b) 1.0 mM after 2 h.

Fig. S7



Fig. S7. Procedure of deemulsification of Pickering emulsion (having pH 6.16) stabilised by 0.05 wt.% lanthanum sulfide nanoparticles with 1.3 mM CTAB by the addition of (a) HCl and (b) KOH, with gentle hand shaking.

Fig. S8



Fig. S8. Surface tensions of CTAB solutions in the presence or absence of 0.05 wt.% lanthanum sulfide nanoparticles.