Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information for

Luminous Composite Ultrathin Films of DCM Dye Assembled with Layered Double Hydroxides and its fluorescence solvatochromism properties for polarity sensor

*Yumei Qin, Ping Zhang, Lincong Lai, Zeyun Tian, Shufang Zheng, and Jun Lu**
State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029, P. R. China

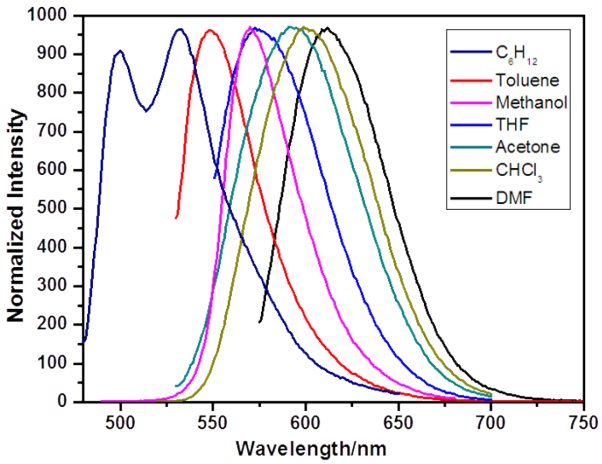

Figure S1. Normalized fluorescence spectra of DCM molecules (5 mg·L^{-1}) in different solvents**.**

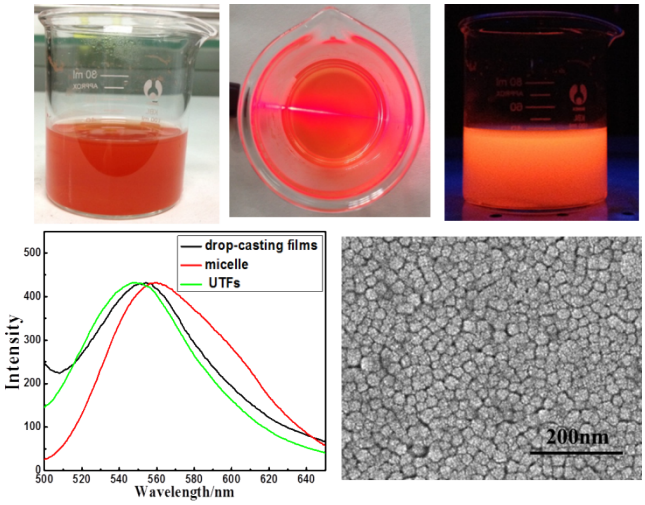

Figure S2. (top) Photographs of the PS-PAA@DCM micelles at daylight; the Tyndall effect with a light beam and under the 365 nm UV illumination; and (bottom) fluorescence spectra of the drop-coating film, micelle and UTFs; and top-view SEM image of the micelles.

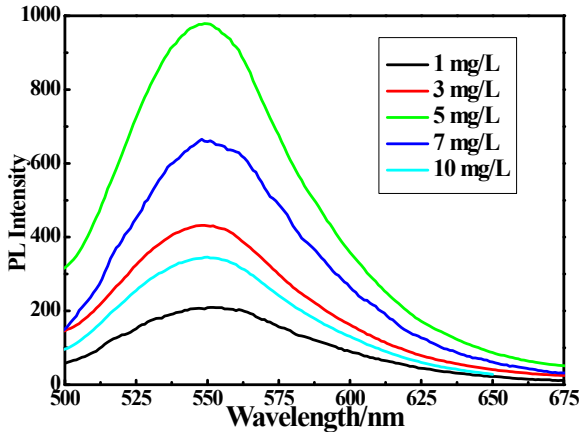

Figure S3. Fluorescence spectra of $(PS\text{-}PAA@DCM/LDH)_n$ UTFs with different incorporated DCM concentrations.

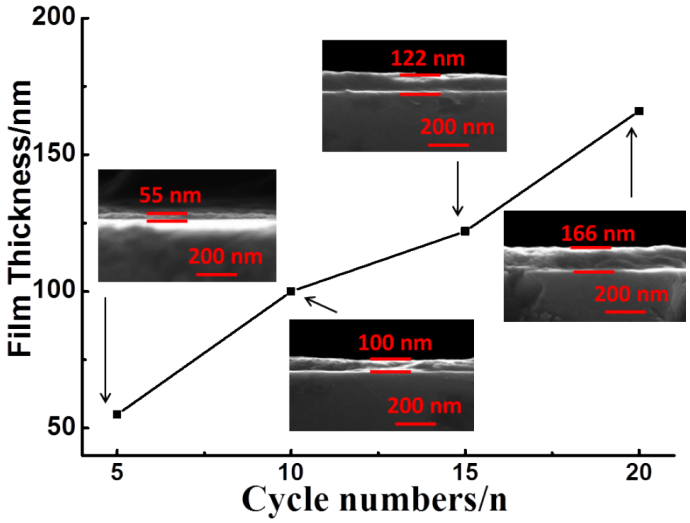

Figure S4. Side-view SEM images of $(PS\text{-}PAA@DCM/LDH)_n$ UTFs (n = 5, 10, 15, 20) and the plot of thickness *vs*. bilayer cycle number n.

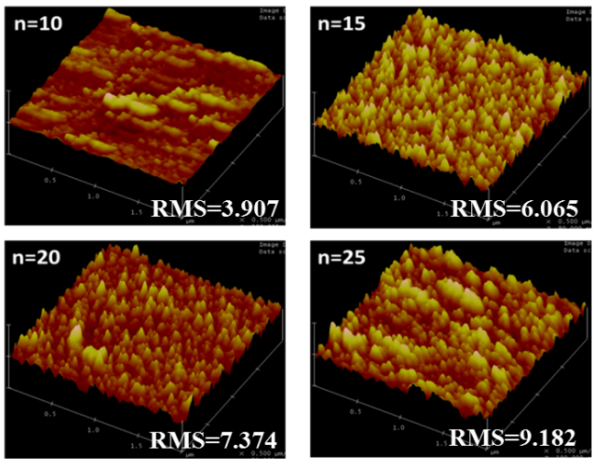

Figure S5. Tapping-mode AFM images and RMS (root-mean-square) roughness (nm) of the $(PS\text{-}PAA@DCM/LDH)_n$ UTFs (n =10, 15, 20, 25, respectively).

Table S1. Fluorescence lifetimes of PS-b-PAA@DCM/LDH UTF-20 and PS- PAA@DCM micelle with 488 nm excitation and detection at their own maxima emission

UTFs	Emission peak	$<\tau_i>$(ns)[a]	A_i(%)	$<\tau>$(ns)	χ^2 [b]
UTF-20 in dry air	551nm	1.785 2.527	39.8 60.2	2.23	1.065
PS-PAA@DCM micelle	560nm	1.536 2.641	68.69 31.31	1.88	1.232
DCM DMF solution (5 mg·L^{-1})	612nm	0.8375 2.483	50.13 49.87	1.66	1.309

[a] τ_i (i = 1, 2) is the fitted fluorescence lifetime. A_i is the percentage of τ_i in the double-exponential case, $<\tau> = A_1\tau_1 + A_2\tau_2$; $A_1 + A_2 = 1$.)

[b] The goodness-of-fit is indicated by the value of χ^2.

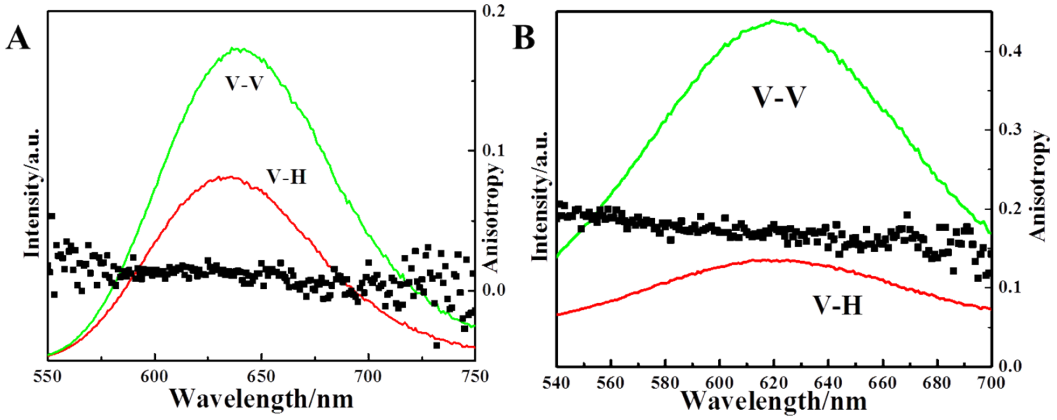

Figure S6. Polarized luminescence profiles for the VV and VH modes and anisotropic value (*r*) for DCM DMF solution (5 mg·L^{-1}) (A) and PS-*b*-PAA@DCM micelle solution (B).

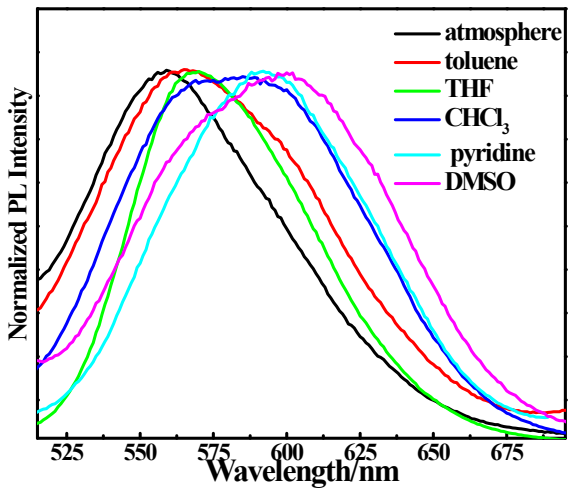

Figure S7. Normalized fluorescence spectra of PS-PAA@DCM drop-coating films in different organic solvent vapours.