Electronic Supplementary Information

Quantum dots insertion in columnar matrix

Experimental section

Materials:

Tri octyl phosphine (90%, technical grade) and tri octyl phosphine oxide (99%) were purchased from Sigma-Aldrich. Cadmium oxide (99%), stearic acid (99%) and selenium powder were purchased from Sisco Research Laboratories (SRL). Octadecyl amine (90%) was purchased from Acros Organics. All the solvents used in the experiments were of AR grade. All the chemicals above were used as received.

Synthesis of CdSe Quantum Dots:

In a typical synthesis, trioctyl phosphine-selenium (TOP-Se) stock solution was prepared by adding 0.3974 g of selenium powder to 3.7 g of TOP in a round bottom flask and the mixture was heated to 150°C under argon flow to obtain a clear solution. In another flask, 0.225 g of cadmium oxide (CdO) and 4 g of stearic acid were heated to 150°C under argon flow. Once CdO was dissolved, the solution was cooled to room temperature. 8 g of trioctyl phosphine oxide (TOPO), 3.18 g of octadecyl amine were subsequently added and heated to 150°C. At this temperature, 2ml of TOP-Se stock solution was swiftly injected into the Cd solution to induce the growth of quantum dots. Two different sizes of quantum dots were obtained by maintaining the temperature of reaction mixture at 120°C and 130°C for 30 min respectively in two different batches. The reaction mixture was added to toulene, to terminate further reaction. Methanol was subsequently added to the toulene dispersion for crashing out QDs. The excess reaction

precursors and capping agents were removed by repeated washing with methanol and dispersing in toulene, the purified QDs were collected after centrifugation. As synthesised QDs are readily dispersible in common organic solvents such as toulene, hexane, chloroform, DCM etc.

Table S1 Phase transition temperatures (peak, °C) and associated enthalpy changes (kcal mol^{-1}, in parentheses) of CdSe QD-DLC composites. Cr = crystal, Cr1= modified crystal, Col_p = columnar plastic phase, Col_h = hexagonal columnar mesophase, I = isotropic phase

Composite	Heating scan	Cooling scan
H4TP	Cr 89(37) col_p 146(31)I	I 144 (30) col_h 79.6(3.5) Cr 67(15) Cr1
3a	Cr 92.4 (39) col_h 145.0(25) I	I 143 (25) col_h 80.6(4) Cr 61.5 (30) Cr1
3b	Cr 92 (40) col_h 143.9(22) I	I 142.1 (22) col_h 80.5(5) Cr 62.9 (31) Cr1
3c	Cr 92 (41) col_h 143.2(22) I	I 140.7 (22) col_h 80.7(7) Cr 63.2 (31) Cr1
3d	Cr 91.1 (41) col_h 141.9(21) I	I 140.4 (20) col_h 80.6(8) Cr 63 (30) Cr1
4a	Cr 90.2 (37) col_h 145(26) I	I 142.7 (25) col_h 79.7(4) Cr 62.2 (32) Cr1
4b	Cr 90.1 (37.8) col_h 144.4(23) I	I 142.4 (20.3) col_h 79.8(4) Cr 61.4 (31) Cr1
4c	Cr 91.6 (39.8) col_h 143.2(22) I	I 141.5 (21.8) col_h 79.7(5) Cr 60.6 (31) Cr1
4d	Cr 89.9 (39.9) col_h 142.3(22) I	I 140.9 (19.9) col_h 79.7(5) Cr 62.3 (31) Cr1

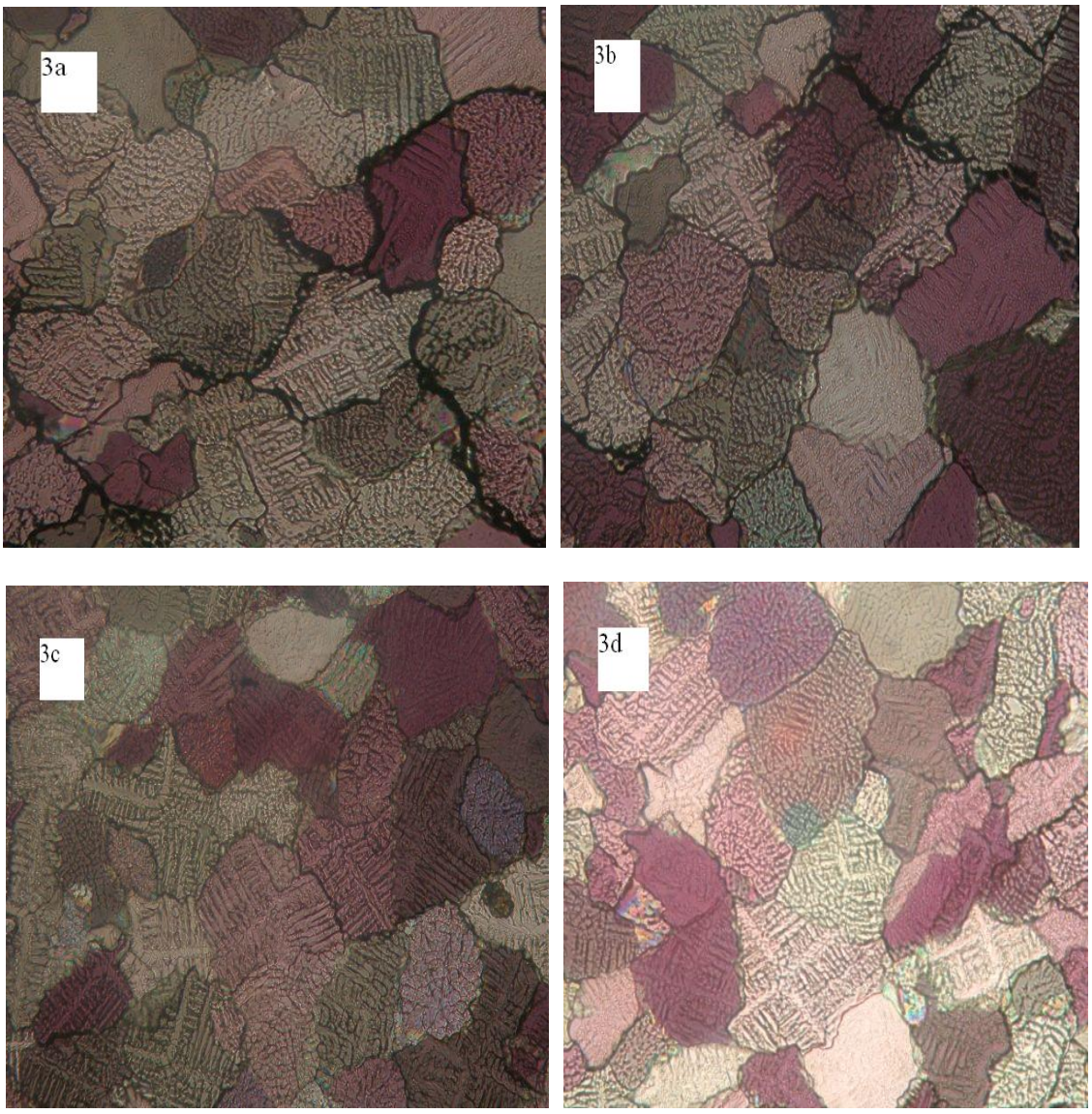

Figure S1. POM images of the columnar phase of 3a-d series composites at 120° C (crossed polarizer, 200 x magnification).

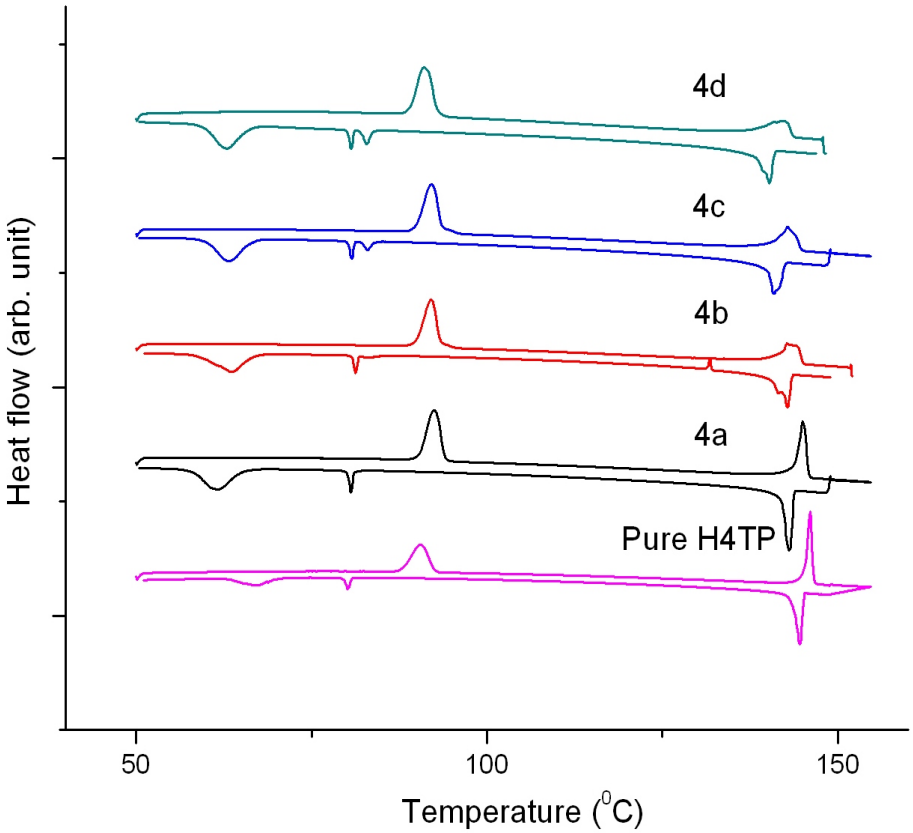

Figure S2. DSC thermogram of 4a-d composites on heating and cooling (scan rate 5 °C min-1)

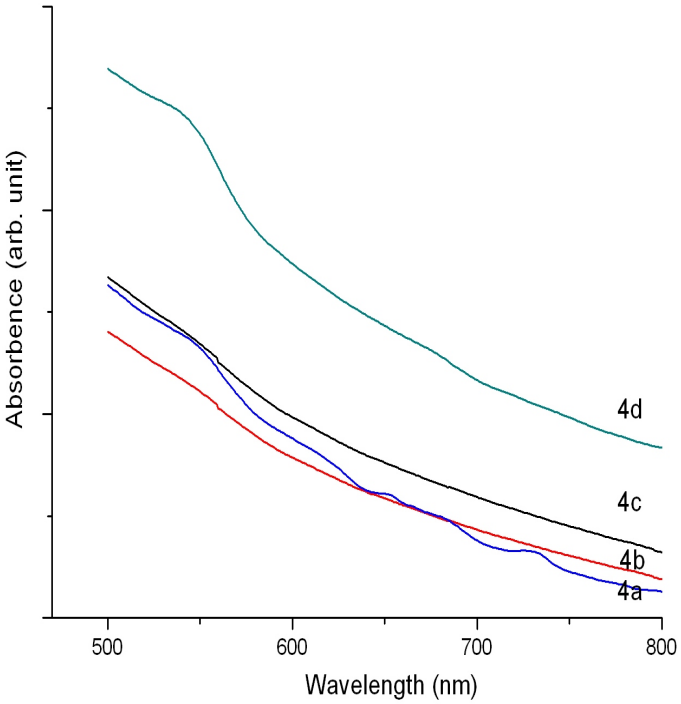

Fig S3. Absorption spectra of composites 4a-4d.

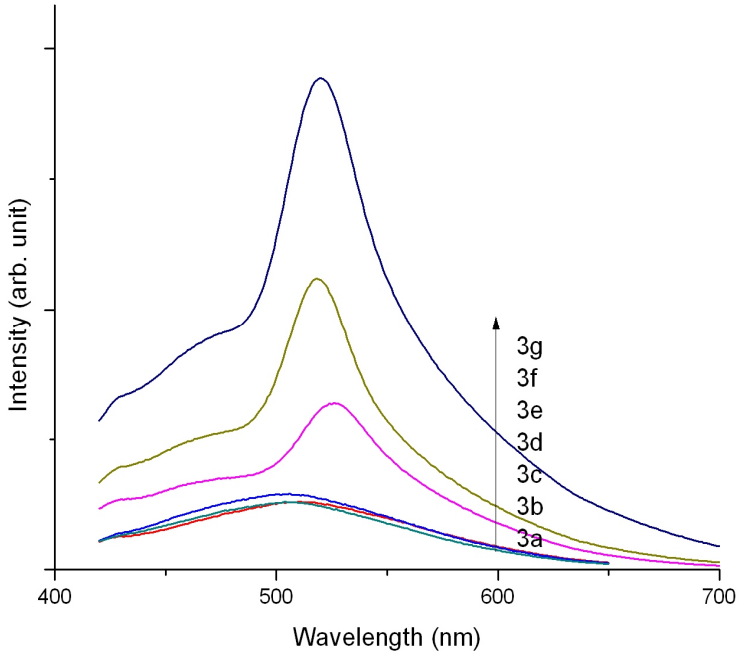

Fig S4. Photoluminescence spectra of composites 3a-3d.

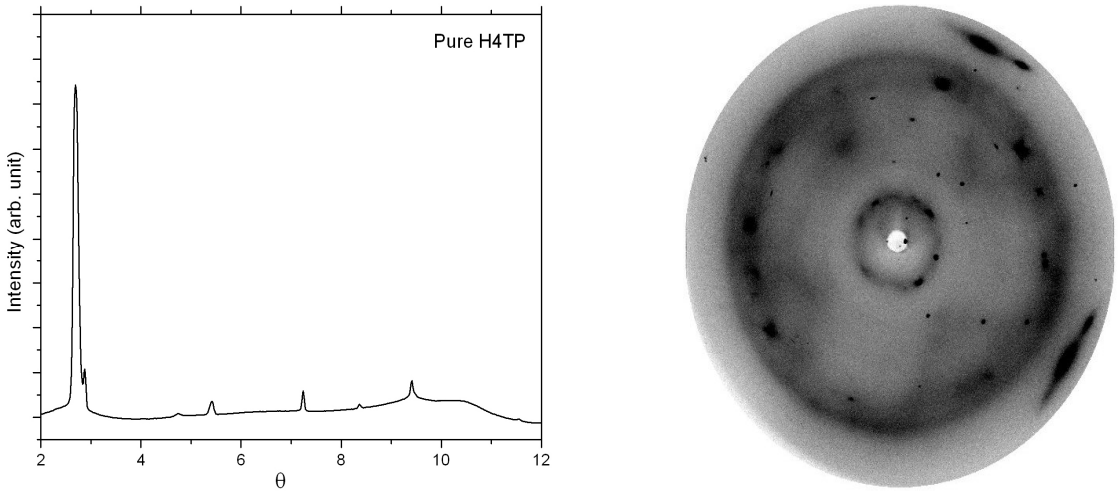

Fig S5. One dimensional intensity Vs θ and XRD pattern of pure H4TP.

XRD details: Diffraction patterns were obtained using Cu Kr (0.154 nm) radiation from a rotating anode X-ray generator (Rigaku, UltraX 18) operating at 50 kV and 80 mA. Data were collected using a 2D image plate detector (Marresearch). Exposures lasted for 1-2 h. Typical instrumental resolution [full width at half-maximum (fwhm)] was 0.18 nm-1. Spacings of the sharp peaks in the diffraction pattern could be measured to an accuracy of 0.03 nm, whereas the corresponding quantity for the diffuse peaks was 0.1 nm.