

The Supporting Information

Self Assembled Monolayers of Chiral Periodic Mesoporous Organosilica as Stimuli Responsive Local Drug Delivery System

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Table S1. Quantitative amount of free PLL and PDL (μg) in solution after each centrifugation (for 1 mg of the respective PMOs).

	1 st Layer PSS	2 nd Layer PLL or PDL	3 th Layer PSS (mg)	4 th Layer PLL or PDL
^{Hst} PMO-(PSS)PLL	0.56 ± 0.05	1.29 ± 0.02	1.25 ± 0.04	1.83 ± 0.03
^{Hst} PMO-(PSS)PDL	0.48 ± 0.05	1.00 ± 0.01	1.26 ± 0.05	1.64 ± 0.05

Table S2. The quantitative amount of Hst (μg) in ^{Hst}PMO-NH₂ and ^{Hst}PMO-(PSS)PLL/PDL (1 mg).

	^{Hst} PMO-NH ₂	^{Hst} PMO-(PSS)PLL	^{Hst} PMO-(PSS)PDL
Hst	3.1 ± 0.01	2.1 ± 0.01	2.3 ± 0.02

Table S3. DLS of ^{Hst}PMO-NH₂ and ^{Hst}PMO-(PSS)PLL/PDL.

	Diameter (DLS, nm) Water
^{Hst} PMO-NH ₂	$287,1 \pm 10.6$
^{Hst} PMO-(PSS)PLL	540.8 ± 3.2
^{Hst} PMO-(PSS)PDL	$527,1 \pm 2.9$

Table S4. Zeta potential value of ^{Hst}PMO-NH₂ with PSS and PLL/PDL.

coating layer	ZP, mV
^{Hst} PMO-NH ₂	42.1 ± 1.4
1st layer (PSS)	$-31.5 \pm 1.7 / -42.07 \pm 0.2$
2nd layer (PLL/PDL)	$26.3 \pm 0.06 / 33.2 \pm 0.9$
3th layer (PSS)	$-31.4 \pm 1.5 / -43.4 \pm 2.1$
4th layer (PLL/PDL)	$38.9 \pm 0.7 / 41.3 \pm 2.1$

Table S5. Zeta potential value of $\text{DOX}^{\text{PMO-NH}_2}$ with PSS and PLL/PDL.

coating layer	ZP, mV
$\text{DOX}^{\text{PMO-NH}_2}$	41.1 ± 1.8
1st layer (PSS)	$-39.9 \pm 2.7/ -32.06 \pm 0.3$
2nd layer (PLL/PDL)	$25.2 \pm 0.6/ 25.06 \pm 1.4$
3th layer (PSS)	$-37.3 \pm 1.2/ -34.01 \pm 1.7$
4th layer (PLL/PDL)	$32.33 \pm 0.5/ 33.1 \pm 0.6$

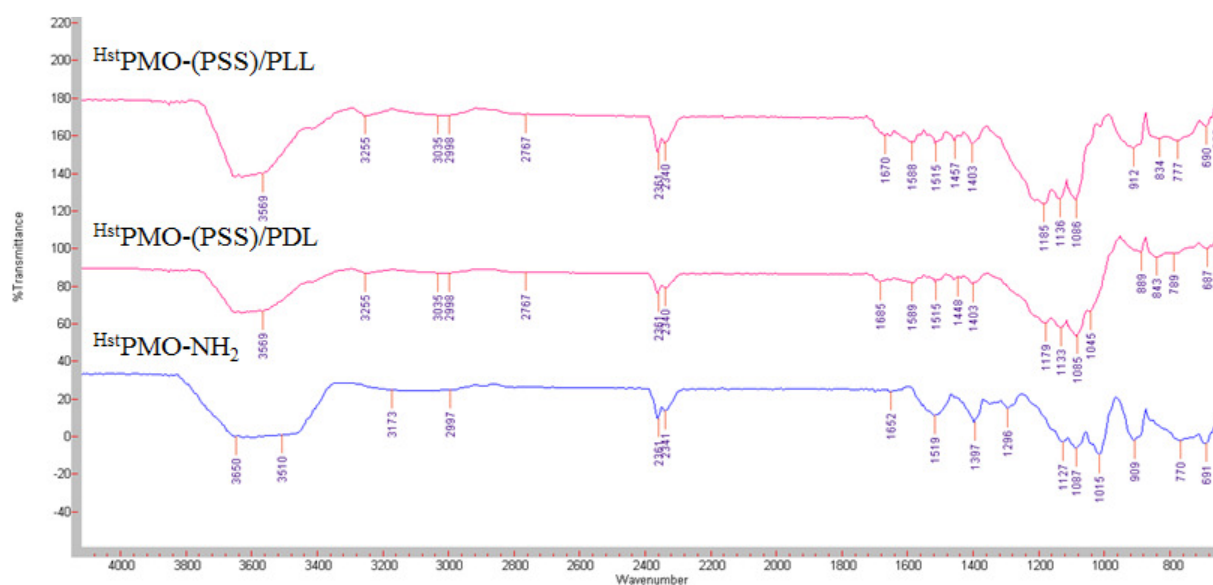


Figure S1. IR spectra of HstPMO-NH_2 , HstPMO-(PSS)PDL , and HstPMO-(PSS)PLL .

Table S6. The amount of Hst ($\mu\text{g/ml}$) released from HstPMO-NH_2 , HstPMO-(PSS)/PDL , and HstPMO-(PSS)/PLL over different time intervals at pH 7.4 and pH 6.0 (N=6).

	HstPMO-NH₂ pH 7.4	HstPMO-NH₂ pH 6	HstPMO-(PSS)/PLL pH 7.4	HstPMO-(PSS)/PLL pH 6	HstPMO-(PSS)/PDL pH 7.4	HstPMO-(PSS)/PDL pH 6
3 min	0.51 \pm 0.07	0.68 \pm 0.10	0.01 \pm 0.01	0.11 \pm 0.01	0.02 \pm 0.005	0.11 \pm 0.003
15 min	0.60 \pm 0.08	0.91 \pm 0.11	0.03 \pm 0.01	0.25 \pm 0.02	0.05 \pm 0.01	0.24 \pm 0.01
30 min	0.66 \pm 0.09	1.12 \pm 0.12	0.15 \pm 0.02	0.46 \pm 0.03	0.10 \pm 0.02	0.37 \pm 0.03
1 h	0.71 \pm 0.10	1.28 \pm 0.13	0.31 \pm 0.03	0.67 \pm 0.04	0.15 \pm 0.03	0.51 \pm 0.05
2 h	0.74 \pm 0.11	1.41 \pm 0.14	0.39 \pm 0.03	0.88 \pm 0.04	0.19 \pm 0.04	0.66 \pm 0.06
3 h	0.75 \pm 0.12	1.56 \pm 0.15	0.47 \pm 0.04	1.09 \pm 0.05	0.24 \pm 0.05	0.79 \pm 0.07
4 h	0.77 \pm 0.12	1.71 \pm 0.15	0.52 \pm 0.05	1.13 \pm 0.06	0.36 \pm 0.07	0.85 \pm 0.08
5 h	0.80 \pm 0.13	1.89 \pm 0.16	0.55 \pm 0.06	1.18 \pm 0.06	0.41 \pm 0.08	0.90 \pm 0.09
7 h	0.82 \pm 0.13	2.07 \pm 0.17	0.58 \pm 0.06	1.23 \pm 0.07	0.45 \pm 0.08	0.96 \pm 0.09
1 day	1.34 \pm 0.16	2.17 \pm 0.17	0.63 \pm 0.07	1.40 \pm 0.08	0.51 \pm 0.10	1.02 \pm 0.10
2 days	1.37 \pm 0.17	2.37 \pm 0.17	0.69 \pm 0.08	1.49 \pm 0.09	0.56 \pm 0.11	1.08 \pm 0.10
3 days	1.41 \pm 0.18	2.45 \pm 0.20	0.74 \pm 0.09	1.57 \pm 0.09	0.62 \pm 0.13	1.14 \pm 0.11
7 days	1.45 \pm 0.20	2.54 \pm 0.21	0.87 \pm 0.09	1.71 \pm 0.10	0.67 \pm 0.13	1.35 \pm 0.12
14 days	1.62 \pm 0.20	2.67 \pm 0.22	1.00 \pm 0.10	1.90 \pm 0.11	0.74 \pm 0.14	1.41 \pm 0.12
30 days	1.63 \pm 0.21	2.68 \pm 0.22	1.01 \pm 0.11	1.91 \pm 0.12	0.74 \pm 0.14	1.43 \pm 0.12

Table S7. The surface coverage (%), surface roughness [Ra (nm)], and water contact angle (°) of the SAMs of ^{Hst}PMO-NH₂ and ^{Hst}PMO-PSS/PDL(PLL).

	Glass	^{Hst}PMO-NH₂	^{Hst}PMO-(PSS)PLL	^{Hst}PMO-(PSS)PDL
Surface coverage (%)	0	95.4 ± 1.6	96.1 ± 2.1	96.8 ± 1.3
Average roughness Ra (nm)	150 ± 30	230 ± 30	390 ± 10	350 ± 30
Water contact angle (°)	91.8 ± 5.9	62.7 ± 2.4	55.2 ± 0.9	49.4 ± 8.2

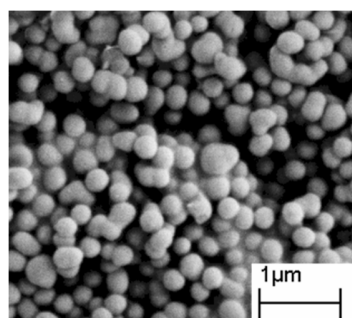


Figure S2. SEM image of PMO-NH₂ after 30 days in cell culture media.

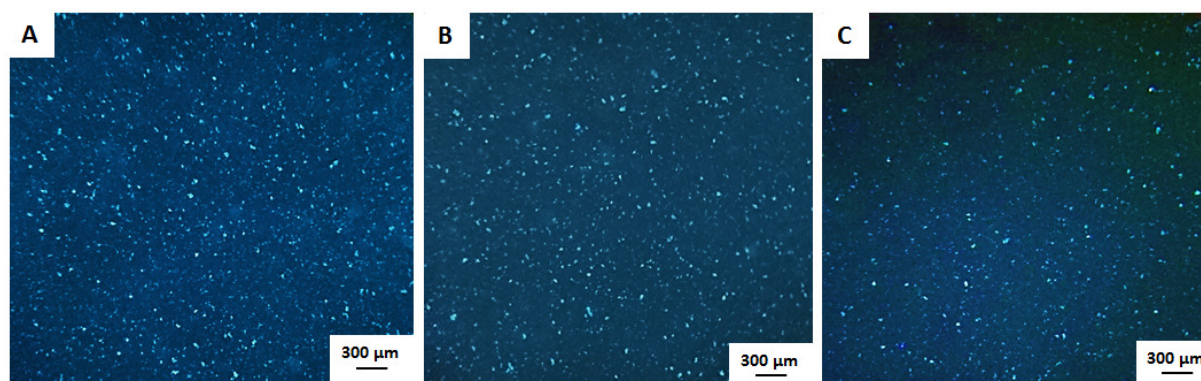


Figure S3. The fluorescence microscopy images of blue emitting Hst dye loaded SAMs of HstPMO-NH_2 **A.** HstPMO-(PSS)PLL **B.** and HstPMO-(PSS)PDL **C.** on glass substrate .

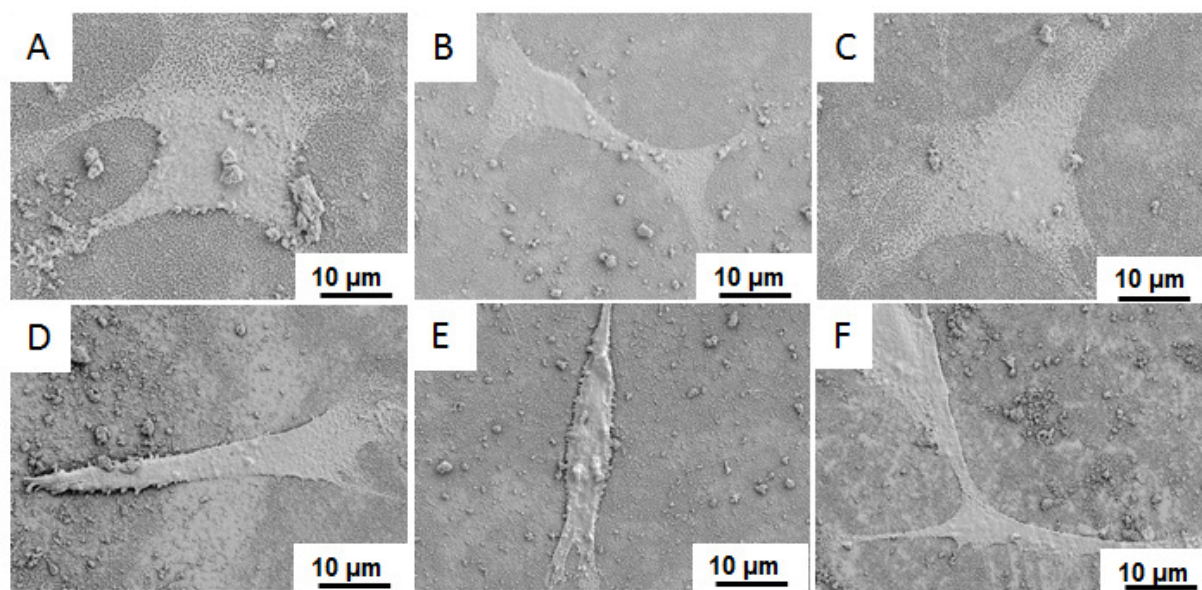


Figure S4. SEM images of 3T3 (A-C) and fibroblast (D-F) cells on the SAMs of HstPMO-NH_2 (A, D), HstPMO-(PSS)PLL (B, E), and HstPMO-(PSS)PDL (C, F).

Table S8. The amount of DOX. ($\mu\text{g/ml}$) released from DoxPMO-NH_2 , DoxPMO-(PSS)/PLL in different time periods at pH 7.4 and 6.0.

	DoxPMO-NH₂ pH 7.4	DoxPMO-NH₂ pH 6	DoxPMO-(PSS)/PLL pH 7.4	DoxPMO-(PSS)/PLL pH 6	DoxPMO-(PSS)/PDL pH 7.4	DoxPMO-(PSS)/PDL pH 6
3 min	1.37 \pm 0.07	4.19 \pm 0.09	0.91 \pm 0.01	1.48 \pm 0.01	0.06 \pm 0.002	0.29 \pm 0.01
15 min	2.82 \pm 0.07	7.15 \pm 0.13	1.86 \pm 0.38	3.07 \pm 0.13	0.10 \pm 0.01	0.73 \pm 0.01
30 min	4.27 \pm 0.12	10.11 \pm 0.20	2.73 \pm 0.56	4.67 \pm 0.22	0.13 \pm 0.02	1.80 \pm 0.04
1 h	5.85 \pm 0.14	11.85 \pm 0.25	3.56 \pm 0.76	6.27 \pm 0.27	0.22 \pm 0.01	2.85 \pm 0.01
2 h	7.35 \pm 0.18	13.52 \pm 0.34	4.52 \pm 0.80	7.88 \pm 0.32	0.32 \pm 0.01	3.88 \pm 0.01
3 h	8.83 \pm 0.20	16.40 \pm 0.41	5.35 \pm 1.10	9.52 \pm 0.37	0.44 \pm 0.01	5.32 \pm 0.01
4 h	10.40 \pm 0.24	18.13 \pm 0.46	6.19 \pm 1.19	11.17 \pm 0.43	0.54 \pm 0.01	5.62 \pm 0.004
5 h	11.93 \pm 0.26	19.61 \pm 0.50	7.01 \pm 1.34	12.78 \pm 0.49	0.83 \pm 0.01	6.78 \pm 0.01
7 h	13.36 \pm 0.33	21.04 \pm 0.54	7.77 \pm 1.42	14.38 \pm 0.55	1.98 \pm 0.006	7.92 \pm 0.01
1 day	14.81 \pm 0.39	22.54 \pm 0.57	9.04 \pm 1.70	15.81 \pm 0.63	3.14 \pm 0.01	9.14 \pm 0.01
2 days	16.14 \pm 0.43	24.43 \pm 0.64	10.02 \pm 1.76	17.22 \pm 0.67	4.28 \pm 0.01	10.28 \pm 0.01
3 days	17.58 \pm 0.46	25.92 \pm 0.66	11.06 \pm 1.83	18.80 \pm 0.68	4.47 \pm 0.001	11.71 \pm 0.03
7 days	18.48 \pm 0.88	27.32 \pm 1.28	11.61 \pm 2.08	19.82 \pm 1.15	5.42 \pm 0.02	12.14 \pm 0.03
14 days	19.28 \pm 1.15	31.04 \pm 2.95	12.53 \pm 2.23	21.48 \pm 1.28	6.38 \pm 0.02	12.74 \pm 0.01
30 days	20.34 \pm 1.18	32.38 \pm 3.00	13.39 \pm 2.36	22.79 \pm 1.31	7.80 \pm 0.07	13.34 \pm 0.05

Table S9. The quantitative numbers ($\times 10^3$) of alive fibroblasts, 3T3 cells, and Colo 818 cells and cell viability (in parenthesis) that were adhered onto $\text{DOX}^{\text{PMO-NH}_2}$, $\text{DOX}^{\text{PMO-(PSS)/PLL}}$ and $\text{DOX}^{\text{PMO-(PSS)/PDL}}$ at different time points.

Time	$\text{DOX}^{\text{PMO-NH}_2}$ Fibroblast	$\text{DOX}^{\text{PMO-NH}_2}$ 3T3	$\text{DOX}^{\text{PMO-NH}_2}$ Colo	$\text{DOX}^{\text{PMO-PSS/PLL}}$ Fibroblast	$\text{DOX}^{\text{PMO-PSS/PLL}}$ 3T3	$\text{DOX}^{\text{PMO-PSS/PLL}}$ Colo	$\text{DOX}^{\text{PMO-PSS/PDL}}$ Fibroblast	$\text{DOX}^{\text{PMO-PSS/PDL}}$ 3T3	$\text{DOX}^{\text{PMO-PSS/PDL}}$ Colo
30 min	13.3±1.5 (89%±9.4)	15.0±1.7 (90%±9)	15.0±1.0 (90%±9)	15.0±1.0 (92%±9)	13.8±1.1 (92%±9)	13.8±1.0 (85%±15)	16.3±0.6 (96%±13)	13.8±0.6 (96%±11)	15.0±1.0 (95%±12)
2 h	11.7±0.6 (78%±14)	10.0±1.0 (67%±10)	8.3±1.1 (63%±12)	13.8±0.6 (85%±13)	13.3±1.5 (80%±11)	13.3±1.1 (73%±6)	13.8±1.1 (85%±19)	13.3±0.6 (84%±4)	13.8±1.1 (81%±12)
4 h	10±1 (67%±10)	8.3±0.6 (56%±8)	6.7±0.6 (50%±7)	15±1.1 (75%±14)	13.8±0.6 (73%±14)	13.3±0.6 (73%±16)	15±1 (80%±14)	15±0.6 (77%±3)	13.8±0.6 (76%±3)
7 h	8.3±0.6 (63%±8)	6.7±1.1 (50%±18)	5.0±1.0 (43%±20)	17.5±0.6 (74%±5)	16.3±0.6 (68%±6)	15.0±1.0 (64%±10)	18.3±0.6 (79%±3)	16.7±0.6 (74%±10)	16.3±0.6 (74%±10)
1 day	11.7±0.6 (58%±7)	5.0±1.0 (38%±14)	3.3±0.6 (33%±16)	18.3±1.1 (65%±3)	17.5±0.6 (61%±3)	16.3±0.6 (56%±4)	18.8±0.6 (65%±3)	17.5±0.6 (61%±6)	17.5±0.6 (58%±3)
2 days	10.0±1.0 (50%±11)	3.75±0.6 (33%±15)	2.5±0.6 (29%±12)	18.8±0.5 (58%±4)	18.3±0.6 (55%±3)	17.5±0.6 (52%±3)	20.0±0.8 (64%±10)	18.8±0.5 (58%±2)	18.3±0.6 (56%±5)
3 days	8.3±0.6 (45%±8)	2.5±0.6 (29%±15)	1.25±0.6 (17%±14)	20.0±0.8 (57%±2)	18.8±0.5 (48%±3)	18.3±0.6 (46%±3)	21.3±0.5 (61%±5)	20.0±0.8 (52%±7)	20.0±0.8 (48%±8)
7 days	6.7±0.6 (33%±6)	1.25±0.5 (17%±8)	1.25±0.6 (11%±6)	21.3±0.5 (53%±0.7)	20.0±0.8 (46%±4)	18.8±0.5 (45%±5)	22.5±0.6 (58%±6)	21.3±0.5 (50%±2)	20.0±1.0 (46%±6)
14 days	5.0±0.8 (23%±8)	1.0±0.4 (10%±1)	1.0±0.4 (8%±1)	22.5±0.6 (46%±2)	21.3±0.5 (39%±4)	20.0±0.8 (36%±4)	23.8±0.5 (53%±3)	22.5±0.6 (47%±3)	21.3±1.0 (44%±5)

Table S10. The amount of Dox (μg) internalized by the fibroblasts, 3T3 cells and Colo 818 cells that were adhered onto $\text{DOX}^{\text{PMO-NH}_2}$, $\text{DOX}^{\text{PMO-(PSS)/PLL}}$ and $\text{DOX}^{\text{PMO-(PSS)/PDL}}$ at different time points.

Time	$\text{DOX}^{\text{PMO-NH}_2}$ in Fibroblast cells	$\text{DOX}^{\text{PMO-NH}_2}$ in 3T3 cells	$\text{DOX}^{\text{PMO-NH}_2}$ in Colo cells	$\text{DOX}^{\text{PMO-PSS/PLL}}$ in Fibroblast cells	$\text{DOX}^{\text{PMO-PSS/PLL}}$ in 3T3 cells	$\text{DOX}^{\text{PMO-PSS/PLL}}$ in Colo 818 cells	$\text{DOX}^{\text{PMO-PSS/PDL}}$ in Fibroblast cells	$\text{DOX}^{\text{PMO-PSS/PDL}}$ in 3T3 cells	$\text{DOX}^{\text{PMO-PSS/PDL}}$ in Colo 818 cells
30 min	0.83±0.02	0.88±0.04	0.93±0.007	0.66±0.02	0.86±0.02	0.87±0.02	0.43±0.02	0.82±0.02	0.82±0.01
2 h	0.85±0.01	0.96±0.01	0.97±0.009	0.69±0.004	0.88±0.04	0.88±0.04	0.46±0.005	0.84±0.01	0.85±0.007
4 h	0.93±0.03	1.00±0.01	1.01±0.01	0.73±0.004	0.93±0.03	0.98±0.01	0.47±0.003	0.89±0.03	0.90±0.005
7 h	0.97±0.007	1.01±0.07	1.02±0.008	0.74±0.01	0.97±0.01	0.98±0.008	0.48±0.006	0.94±0.003	0.95±0.02
1 day	1.25±0.02	1.72±0.01	1.89±0.007	0.76±0.008	1.27±0.002	1.37±0.01	0.51±0.02	1.01±0.01	1.02±0.01
2 days	1.28±0.008	1.75±0.02	1.90±0.01	0.78±0.01	1.31±0.008	1.41±0.01	0.59±0.02	1.02±0.005	1.05±0.006
3 days	1.31±0.002	1.82±0.005	1.91±0.03	0.81±0.01	1.38±0.02	1.45±0.006	0.61±0.005	1.04±0.008	1.08±0.008
7 days	1.39±0.027	1.83±0.007	2.09±0.007	0.84±0.008	1.40±0.02	1.47±0.03	0.63±0.002	1.07±0.01	1.10±0.006
14 days	1.41±0.03	1.87±0.01	2.11±0.01	0.88±0.01	1.43±0.007	1.50±0.03	0.66±0.002	1.12±0.02	1.17±0.02