Supporting Information

Synthesis of Antireflective Silica Coatings through the Synergy of Polypeptide Layer-by-Layer Assemblies and Biomineralization

Yung-Lun Lee, Ting-Xuan Lin, Feng-Ming Hsu and Jeng-Shiung Jan*

Department of Chemical Engineering National Cheng Kung University No 1, University Rd., Tainan, Taiwan 70101 (Taiwan)

Table S1. Characterization of poly(Z-L-lysine) (PZLL) and poly(γ-benzyl glutamate) (PBLG) by GPC analysis.

Sample	M_n	M_w	M_w/M_n
$PZLL_{70}$	17,000	22,000	1.28
$PZLL_{170}$	44,000	57,300	1.30
$PZLL_{340}$	91,000	110,000	1.20
$PBLG_{100}$	18,200	2,1000	1.16

Table S2. Feed molar ratio of anhydride to lysine and obtained degree of substitution (DS) for decanoyl-modified PLL (PLL-*g*-Dec) graft copolypeptides.

Sample	Feed molar ratio of anhydride to lysine (%)	Obtained DS (%)
PLL_{70}-*g*-$Dec_{0.25}$	25	23.0
PLL_{170}-*g*-$Dec_{0.25}$	25	21.3
PLL_{170}-*g*-$Dec_{0.4}$	40	33.6
PLL_{340}-*g*-$Dec_{0.25}$	25	22.7
PLL_{340}-*g*-$Dec_{0.4}$	40	34.3

Table S3. Hydrodynamic diameter (size) and zeta potential of PLL-*g*-Dec vesicles at pH 5.0 and 7.4 by DLS and electrophoresis analyses.

Sample	pH	Size (nm)	PDI	Zeta potential (mV)
PLL_{70}-*g*-$Dec_{0.25}$	7.4	181.9±5.7	0.31±0.01	17.3±0.5
	5.0	141.4±0.9	0.32±0.01	23.2±0.8
PLL_{170}-*g*-$Dec_{0.25}$	7.4	62.3±5.7	0.15±0.02	18.1±1.3
	5.0	107.3±0.5	0.29±0.01	37.3±0.2
PLL_{170}-*g*-$Dec_{0.4}$	7.4	72.6±0.3	0.11±0.01	18.9±0.7
	5.0	99.3±0.9	0.19±0.01	25.8±0.8
PLL_{340}-*g*-$Dec_{0.25}$	7.4	44.3±0.1	0.17±0.01	9.4±1.6
	5.0	161±3.1	0.33±0.01	25.4±2.8
PLL_{340}-*g*-$Dec_{0.4}$	7.4	43.1±0.3	0.28±0.01	20.0±0.8
	5.0	124.0±1.0	0.36±0.01	34.2±3.2

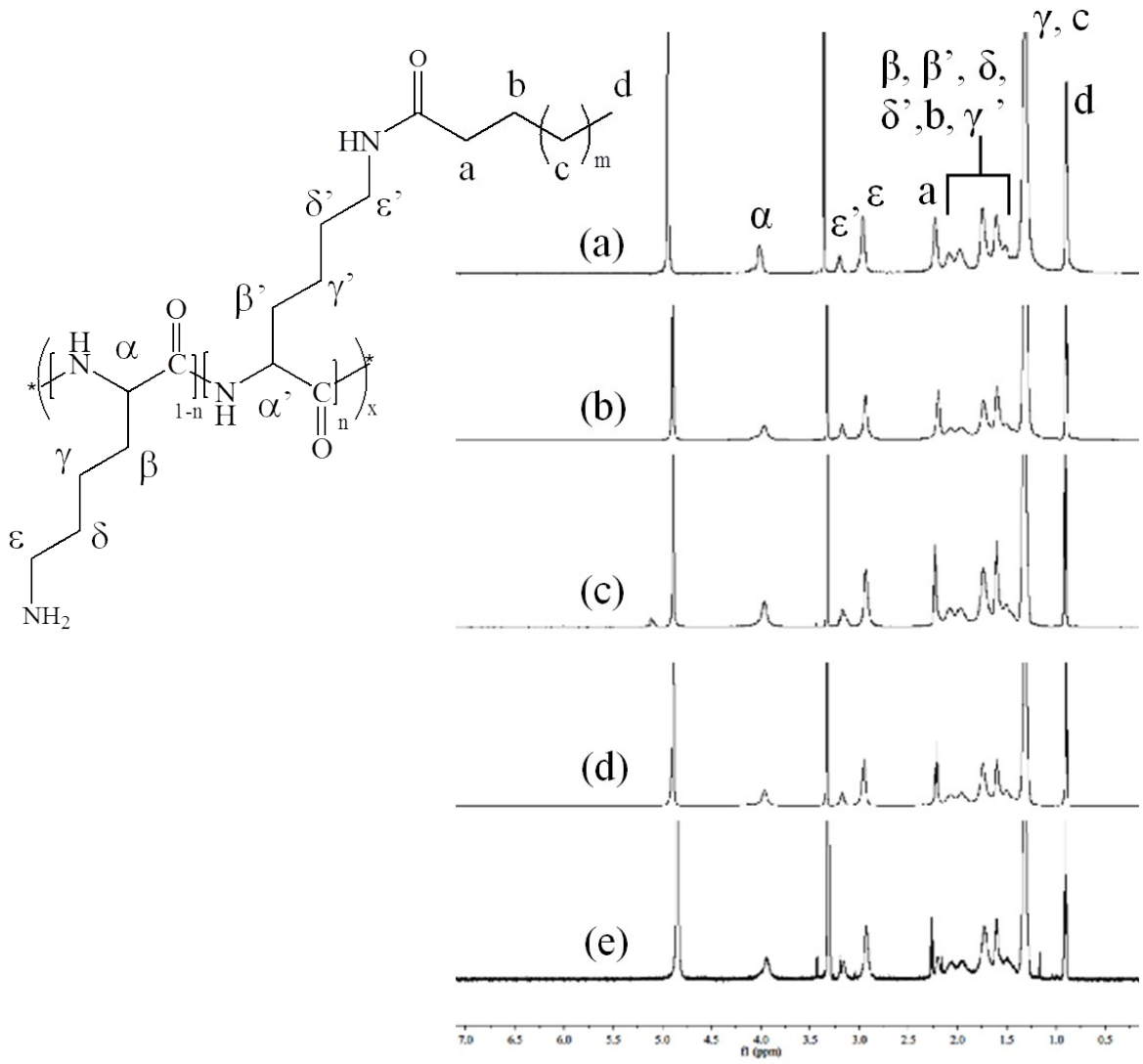

Figure S1. ^{1}H NMR spectra of (a) PLL_{70}-*g*-$Dec_{0.25}$, (b) PLL_{170}-*g*-$Dec_{0.25}$, (c) PLL_{170}-*g*-$Dec_{0.4}$, (d) PLL_{340}-*g*-$Dec_{0.25}$, and (e) PLL_{340}-*g*-$Dec_{0.4}$ graft copolypeptides.

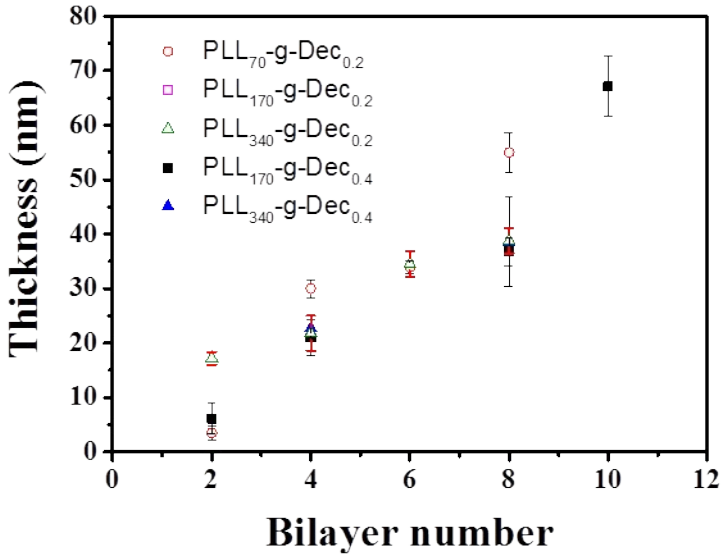

Figure S2. Thickness of (PLL-*g*-Dec/PLGA)$_n$ multilayer films as a function of number of bilayer (m). The multilayer films were prepared at pH 7.4 (n=5).

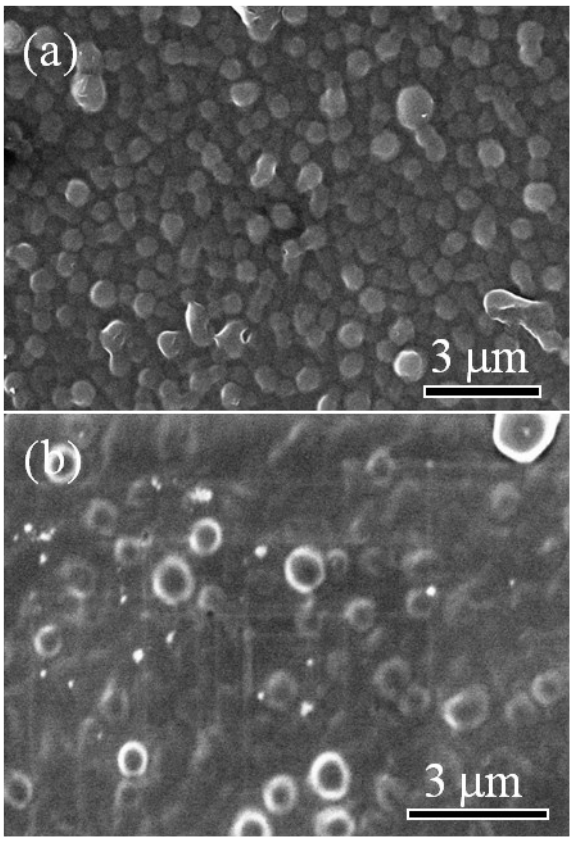

Figure S3. SEM images of the top view of (a) PLL_{170}-*g*-$Dec_{0.25}$/$PLGA_{100}$ and (b) PLL_{170}-*g*-$Dec_{0.4}$/$PLGA_{100}$ multilayer films with 8 bilayers. The samples were prepared at pH 7.4.

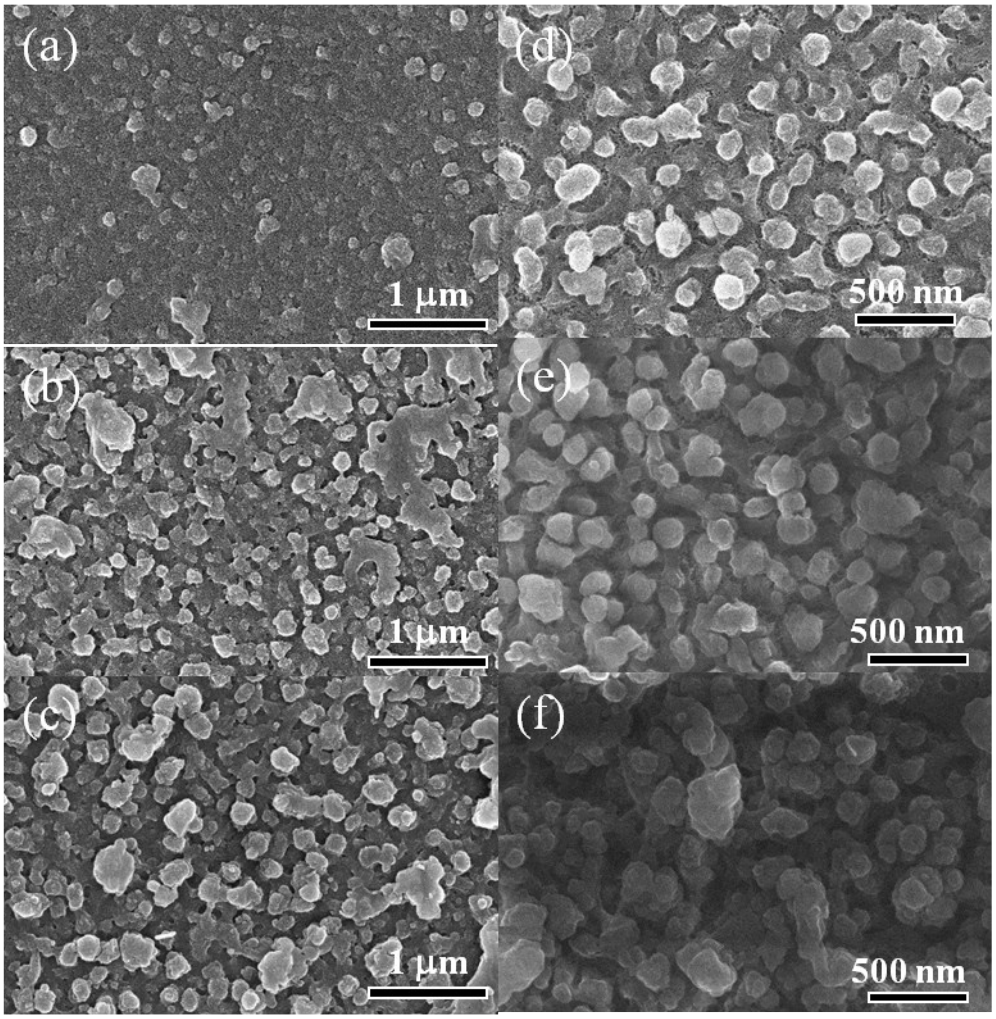

Figure S4. SEM images of the top view of mesoporous silica films prepared by (a-c) PLL_{70}-*g*-$Dec_{0.25}$/$PLGA_{100}$ and (d-f) PLL_{170}-*g*-$Dec_{0.4}$/$PLGA_{100}$ multilayer films with (a, d) 8, (b, e) 10, and (c, f) 12 bilayers.

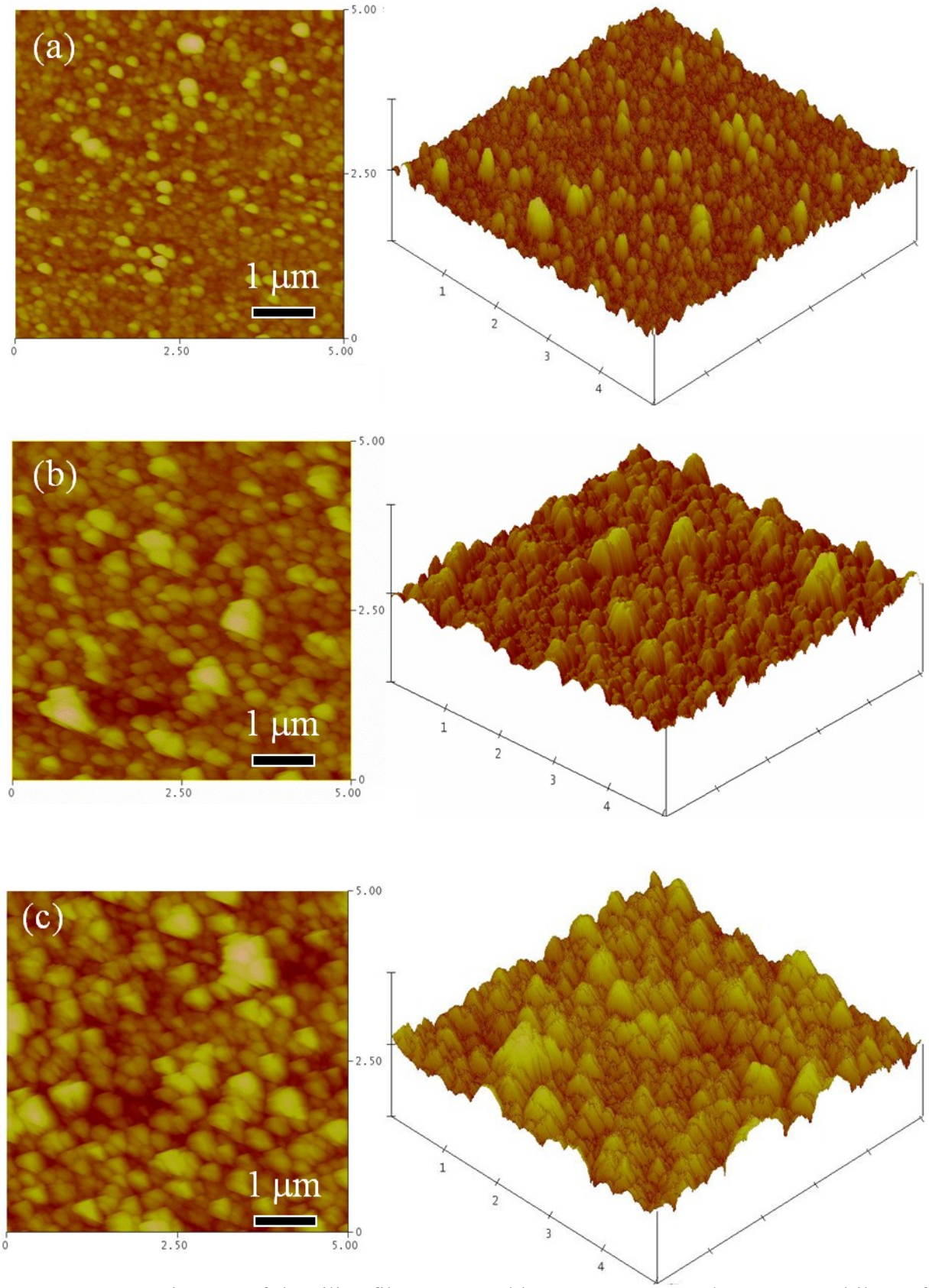

Figure S5. AFM images of the silica films prepared by PLL_{70}-*g*-$Dec_{0.25}$/$PLGA_{100}$ multilayer films with (a) 8, (b) 10, and (c) 12 bilayers.

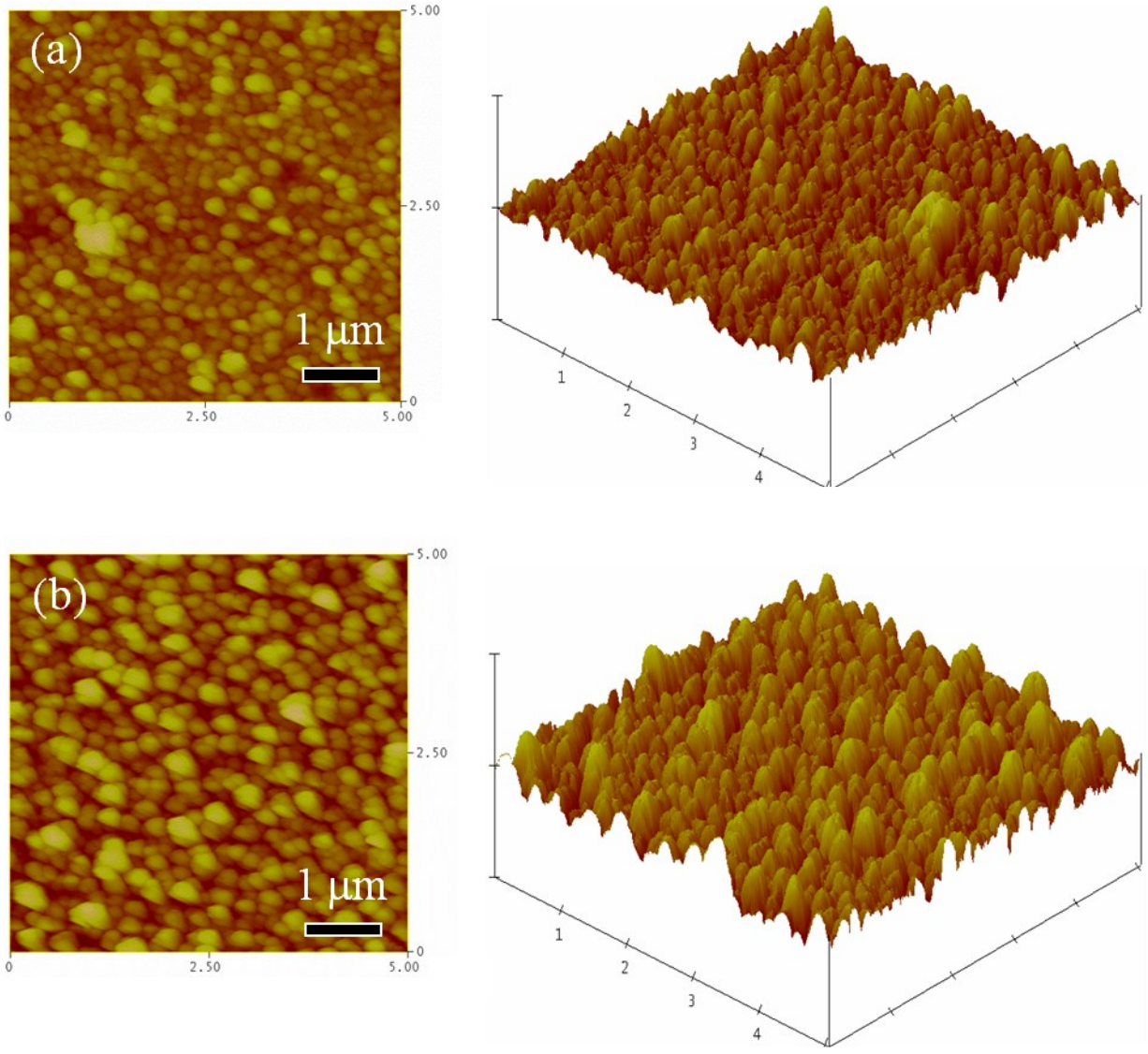

Figure S6. AFM images of the silica films prepared by prepared by PLL_{170}-*g*-$Dec_{0.4}$/$PLGA_{100}$ multilayer films with (a) 8 and (b) 10 bilayers.

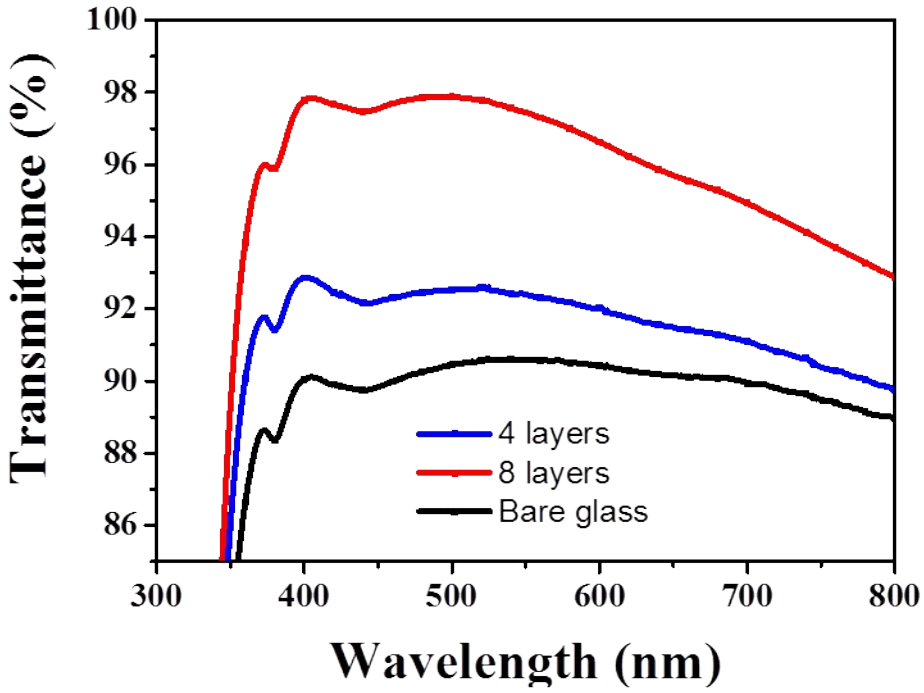

Figure S7. Transmission spectra of AR silica films prepared by PLL_{340}-*g*-$Dec_{0.4}$/$PLGA_{100}$ multilayer films with 4 and 8 bilayers measured by UV-vis.