Supplementary Material (ESI) for Journal of Materials Chemistry

A novel fast response fiber-optic pH sensor based on nanoporous self-assembly multilayer films

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Electronic Supplementary Information (ESI) Contents

1. LbL self-assembly of (PVPMC+PDDA)/PAA multilayer films

The effect of pH of the blended polycation solutions on the assembly behavior of (PVPMC+PDDA)/PAA were investigated by UV–vis spectrometer. Fig. 1S shows UV-vis spectra of $(PVPMC+PDDA/PAA)_n$ multilayer films deposited at various pH pairs with increasing bilayer number.

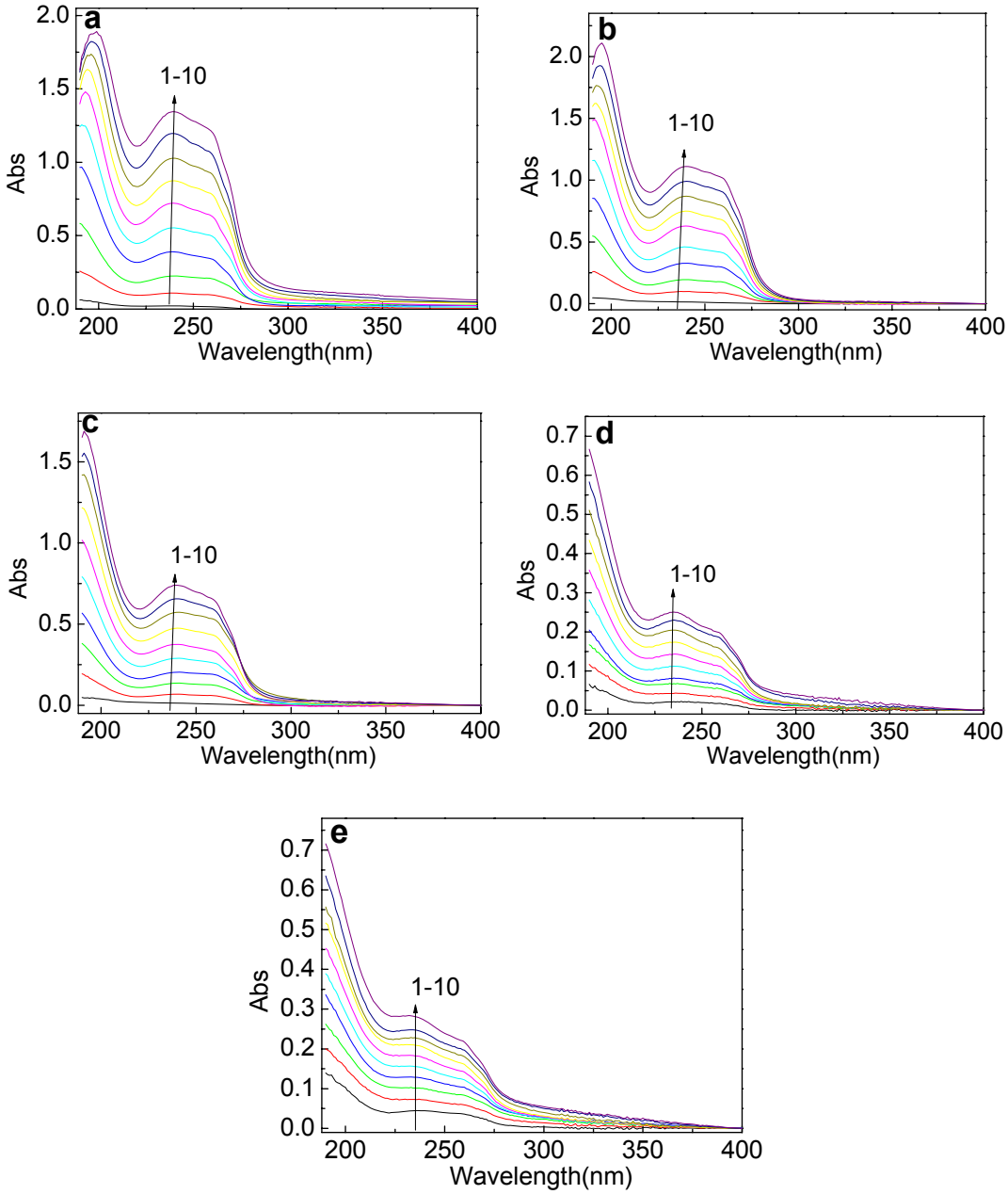


Fig. 1S UV spectra of $(PVPMC+PDDA/PAA)_n$ multilayer films at various bilayer numbers n = 1-10 assembled at various pH of (a) pH 2.0/pH3.0, (b) pH 2.5/pH3.0, (c) pH 2.8/pH3.0, (d) pH 3.0/pH3.0, (e) pH 3.2/pH3.0

2. Disintegration of (PVPMC+PDDA)/PAA multilayer films

The disintegration of (PVPMC+PDDA)/PAA multilayer films fabricated at various pH pairs were performed in 0.15M NaCl solution and investigated by UV–vis spectrometer (Fig. 2S and Fig. 3S) and QCM (Fig. 4S).

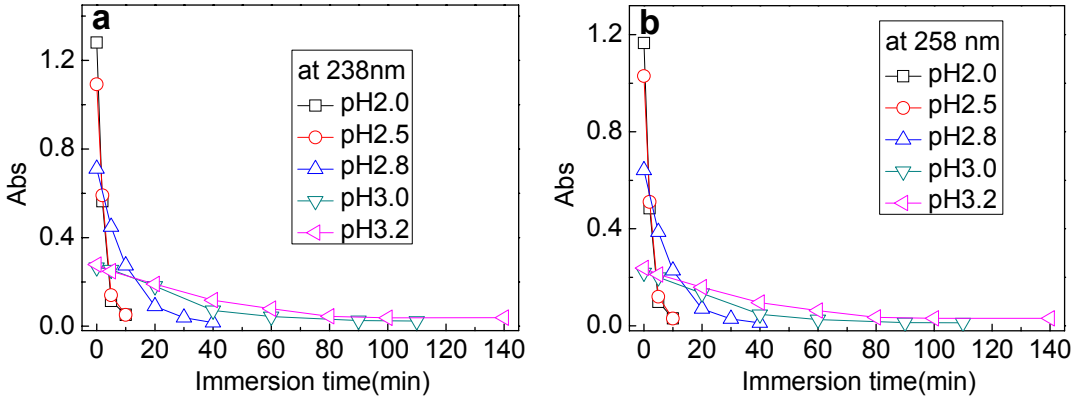
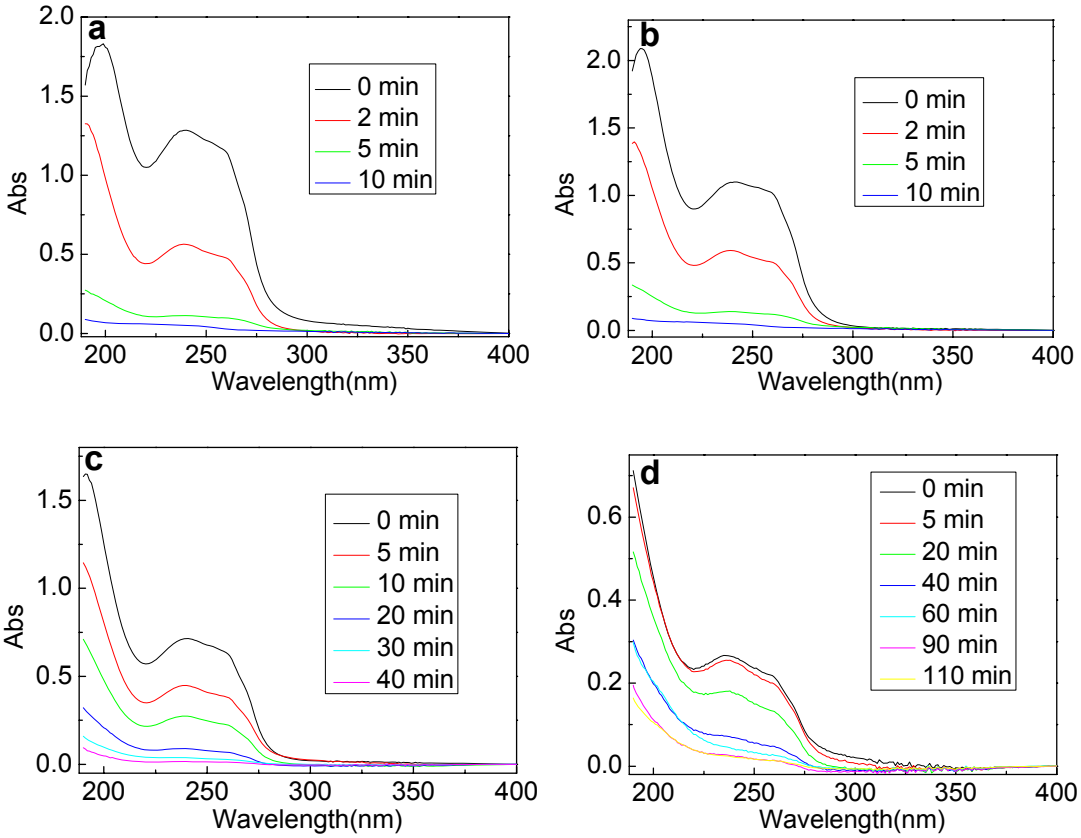


Fig. 2S The UV-absorbance at (a) 238 nm and (b) 258 nm of (PVPMC+PDDA)/PAA multilayer films assembled at various pH value of PVPMC and PDDA blend solution of pH 2.0, 2.5, 2.8, 3.0, and 3.2 as a function of the immersion time in 0.15M NaCl solution.



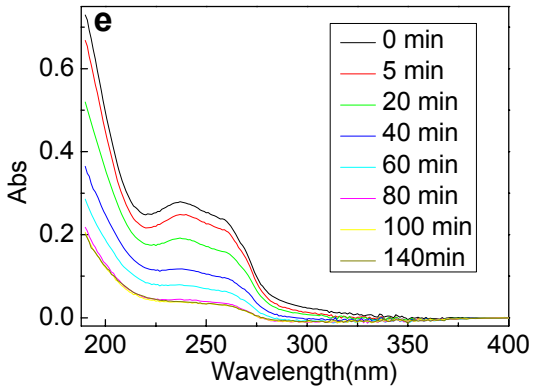


Fig. 3S Variation of UV spectra of $(PVPMC+PDDA/PAA)_n$ multilayer films prepared at pH value of (a) pH 2.0/pH3.0, (b) pH2.5/pH3.0, (c) pH2.8/pH3.0, (d) pH 3.0/pH3.0, (e) pH 3.2/pH3.0 with different immersion times in 0.15M NaCl.

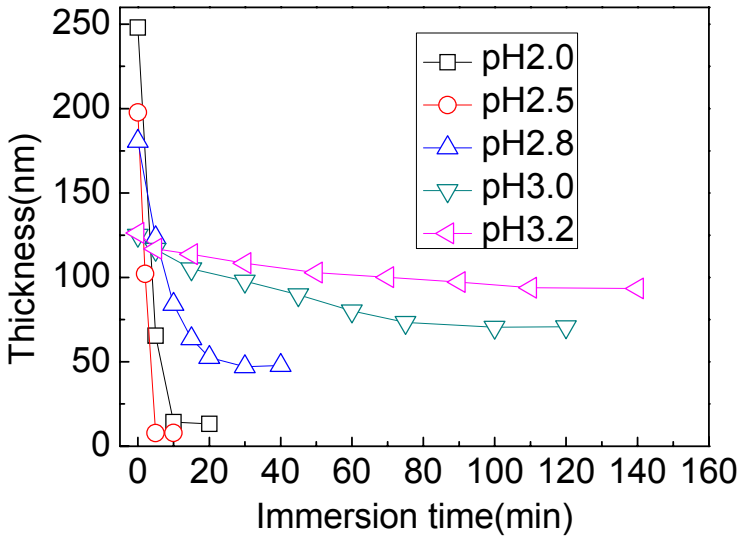


Fig. 4S The film thickness of (PVPMC+PDDA)/PAA multilayer films prepared at various pH as a function of the immersion time in 0.15M NaCl solution.

3. Deposition of nanoporous multilayer film on TCFMI

Fig. 5S shows the changes of the spectral wavelength before and after the deposition of LbL multilayer films on the TCFMI surface. These changes indicated the successful construction of the LbL multilayer films on the surface of TCFMI.

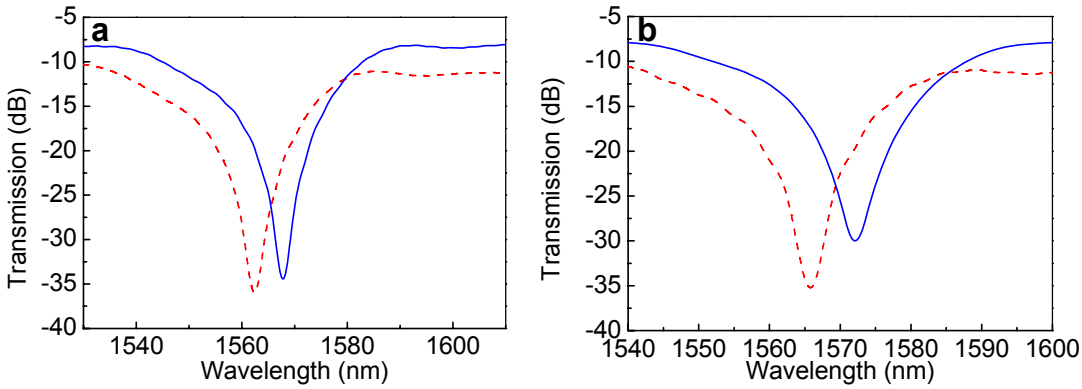


Fig. 5S (a) Spectra of TCFMI before (dash line) and after (solid line) the deposition of $[(PDDA+PVPMC)/PAA]_{10}$ multilayer film after immersing in 0.15M NaCl for 40 min, (b) spectra of TCFMI before (dash line) and after (solid line) the deposition of $(PDDA/PAA)_{10}$ multilayer film.