Simultaneous Visual Detection and Removal of Lead(II) Ions with Pyromellitic Dianhydride-Grafted Cellulose Nanofibrous Membranes

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Supplementary Figures

Fig. S1. Photograph shows the experimental detailed of the setup for colorimetric detection and enrichment of Pb^{2+}.

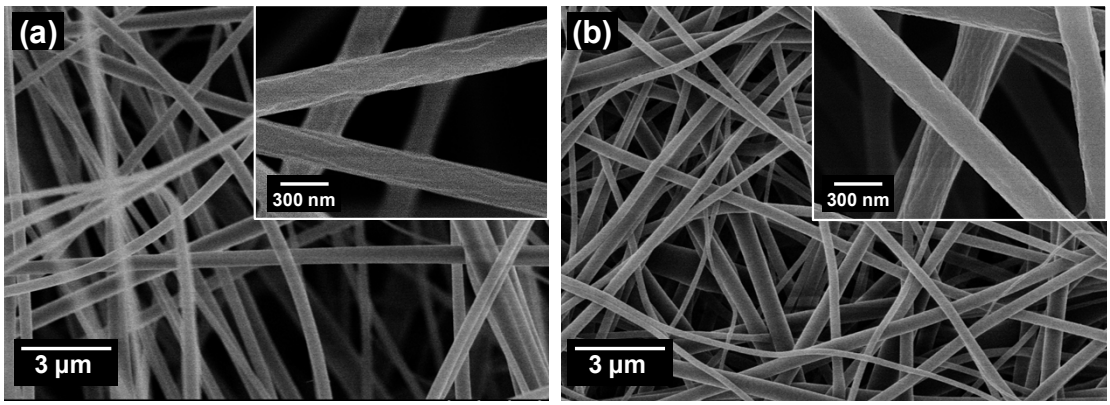

Fig. S2. FE-SEM images of (a) CA and (b) DCA NFM. Insets are the corresponding images at high magnification.

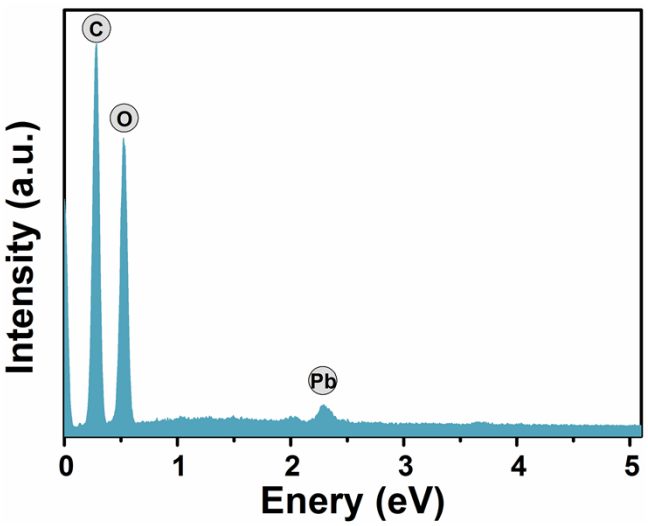

Fig. S3. EDX image of DCA_1-$PMDA_3$ after incubation with Pb^{2+}.

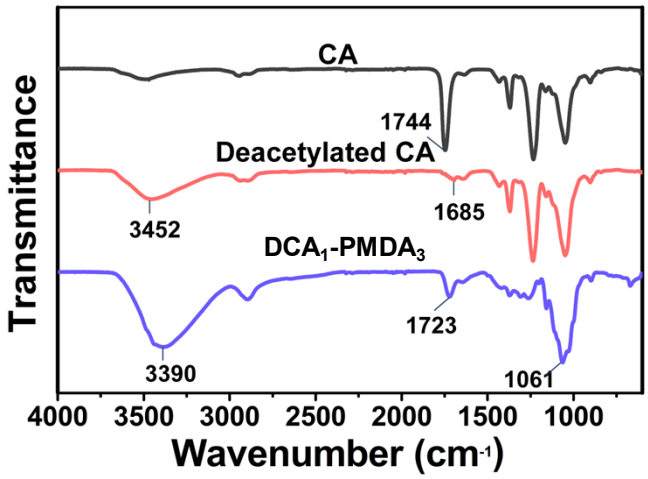

Fig. S4. FT-IR spectra of CA, DCA and DCA_1-$PMDA_3$ NFM.

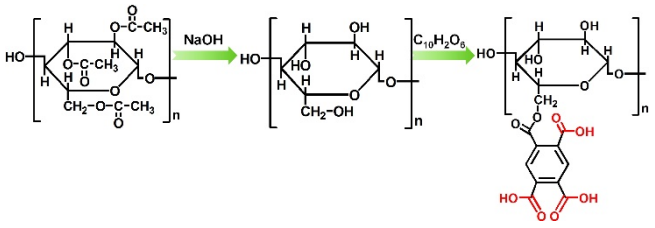

Fig. S5. Reaction scheme for the modification of CA to DCA-PMDA.

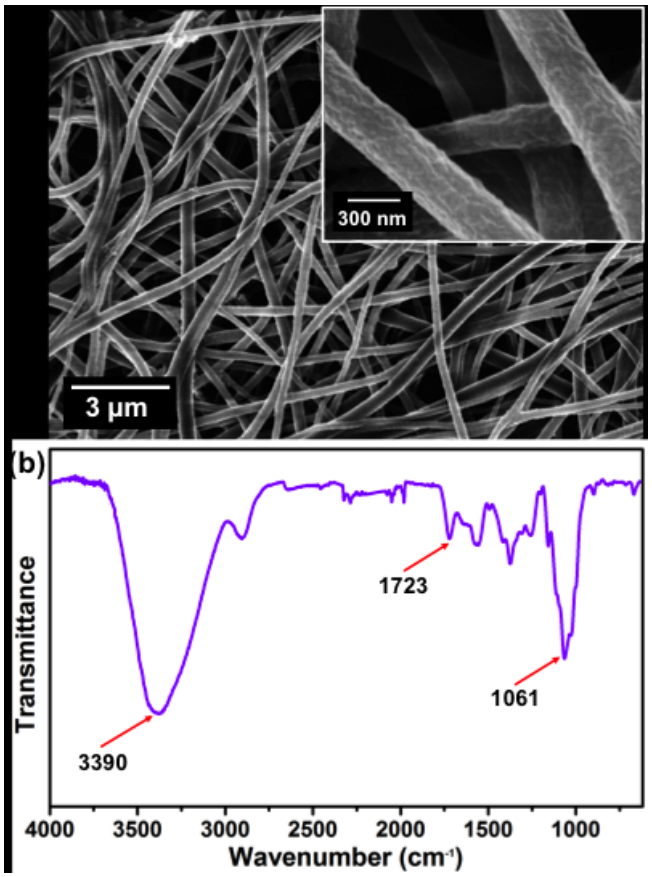

Fig. S6. FE-SEM image (a) and FT-IR spectrum (b) of strip after treated with 3 M HNO_3 for 10 times. Inset is the corresponding image at high magnification.

Supplementary Tables

Table S1. Comparison of naked eye detect limit of different NFM based sensor strips for Pb^{2+}.

Colorimetric Pb^{2+} sensing materials	Naked eye detect limit	Ref.
Gold probe loaded PA6/NC	0.2 μM	1
Gold probe loaded PA6/PVdF	0.48 μM	2
PDA-5EG/PAN	0.48 μM	3
PDA-Gly/PAN/SiO_2	0.2 μM	4
DCA-PMDA	0.048 μM	This study

Table S2. Determination and removal of Pb^{2+} levels in real water samples.

Samples	Pb^{2+} (μM)		%Recovery	Pb^{2+} concentration after filtration (μM)
	Added	Found		
Lake water	1	1.04 ± 0.24	104	$<4.8\times10^{-4}$
	2	1.98 ± 0.27	99	$<4.8\times10^{-4}$
	4	3.71 ± 0.34	93	$<4.8\times10^{-4}$
Tap water	1	0.91 ± 0.45	91	$<4.8\times10^{-4}$
	2	1.87 ± 0.29	94	$<4.8\times10^{-4}$
	4	4.35 ± 0.36	109	$<4.8\times10^{-4}$

Table S3. The rejection of DCA-PMDA towards different concentration of Pb^{2+} in the feed solution.

C_0 (μM)	Rejection (%)
10	92.74
20	96.82
50	82.59
100	53.71
200	30.93

Table S3. Isotherm parameters for the adsorption of Pb^{2+} onto the DCA-PMDA.

Isotherms	Isotherm constants	value
Langmuir	q_m (mg/g)	326.8
	K_L	2.76
	R^2	0.9964
Freundlich	1/n	0.2941
	K_F	138.23
	R^2	0.7153
DKR	q_{DR}	307.58
	β	0.75×10^{-7}
	R^2	0.74772

Supplementary References

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