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Electronic supplementary information

Preparation of Copper Phthalocyanine-Polyaniline Nanocomposite Films by In-situ Method and Their Electrochemical and Electrochromic Properties

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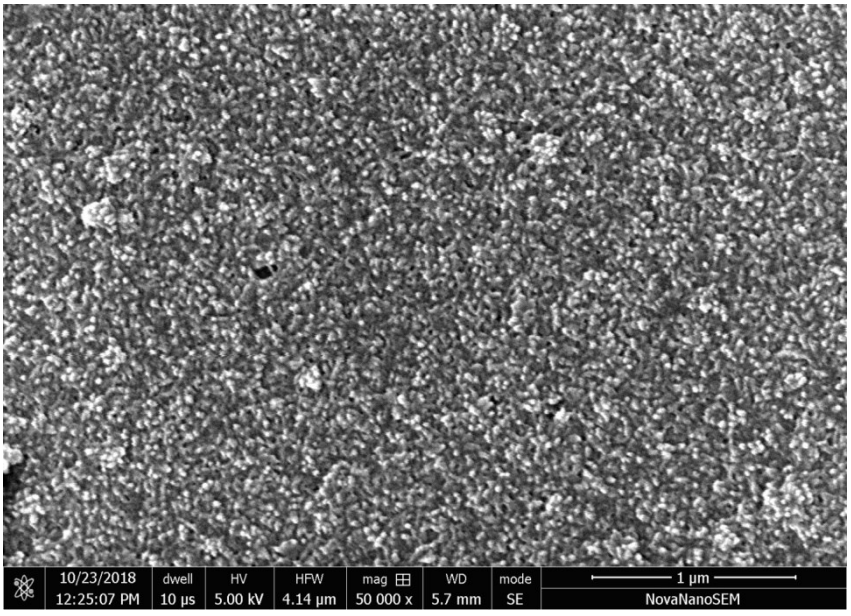

Fig. S1. SEM images of PANI film.

Table S1. A comparison of PANI-based electrochromic films properties.

	Operation condition	λ/nm	$T_{(discoloring)}/T_{(coloring)}$	Δ T%	Cycle life	Ref.
Grapheme/PANI	-0.1V~0.5V	700	1.4s/1.4s	15.9%	>300cycles	1
NC/PANI	0.2V~0.8V	665	1.5s/1.0s	62.9%	>500cycles	2
TiO_2/ PANI	-0.7V~1.0V	700	4.8s/2.2s	57.6%	>1000cycles	3
CuPc/PANI	-0.2V~0.7V	730	1.96s/1.02s	58%	>500cycles	This work

References

(1) L. Zhao, L. Zhao, Y. X. Xu, T. F. Qiu, L. J. Zhi and G. Q. Shi, *Electrochim. Acta*, 2009, **55**, 491-497.

(2) S. H. Zhang, G. Sun, Y. F. He, R. F. Fu, Y. C. Gu and S. Chen, *ACS Appl. Mater. Interfaces*, 2017, **9**, 16426-16434.

(3) G. F. Cai, J. P. Tu, D. Zhou, J. H. Zhang, Q. Q. Xiong, X. Y. Zhao, X. L.Wang and C. D. Gu, *J. Phys. Chem. C,* 2013, **117,** 15967-15975.

Table S2. A comparison of different charge amount CuPc-PANI electrochromic films properties.

	discoloring time	coloring time	optical contrast
PANI	2.9s	0.9s	56%
CuPc(-0.001C)-PANI	2.04s	1.19s	47%
CuPc(-0.002C)-PANI	1.96s	1.02s	58%
CuPc(-0.003C)-PANI	2.7s	1.35s	49%
CuPc(-0.004C)-PANI	2.72s	1.01s	46%

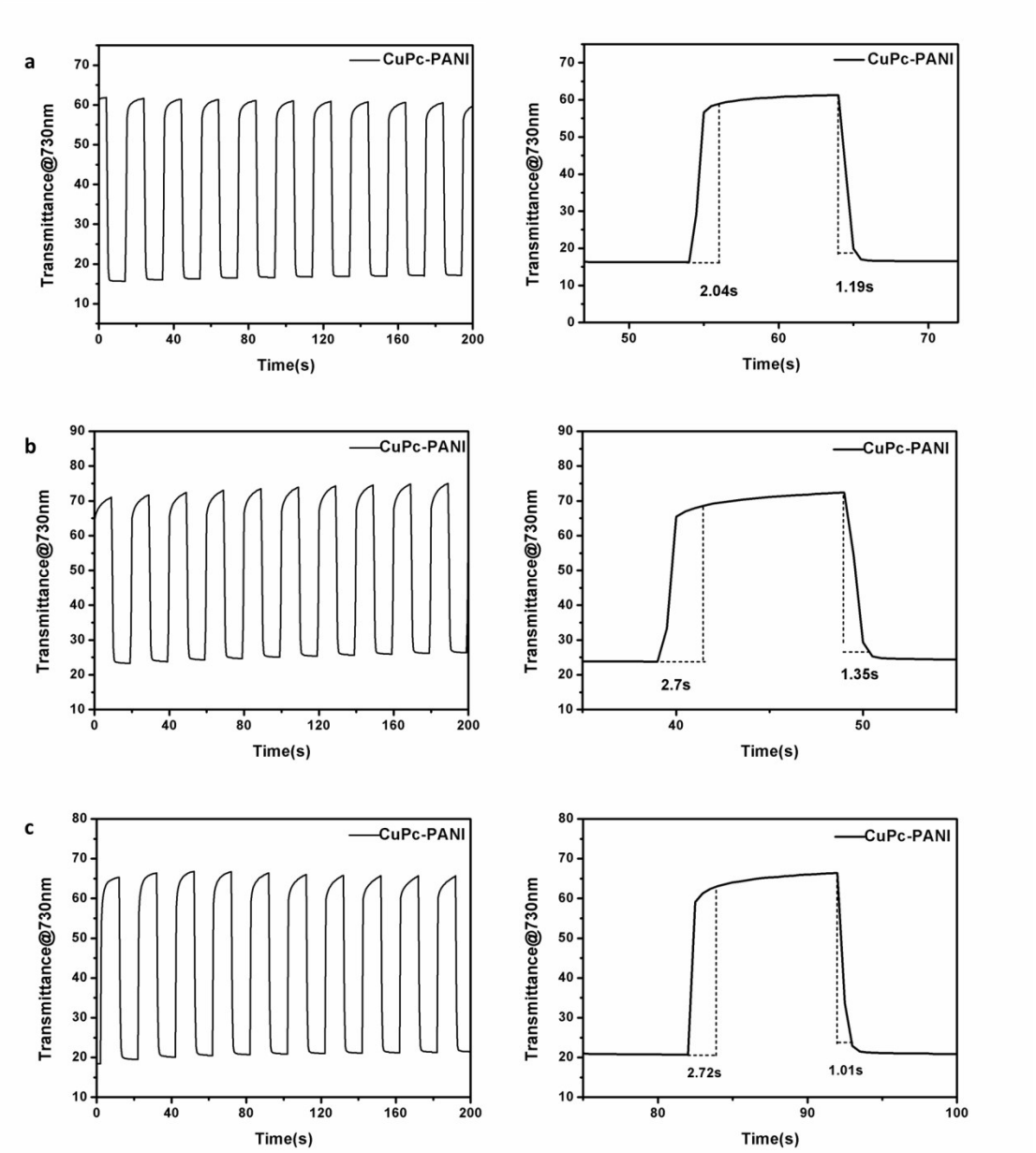

Fig. S2. Kinetic optical transmittance (left) and Responses time (right) curves at 730 nm of CuPc (-0.001C)-PANI composite film (a), CuPc (-0.003C)-PANI composite film (b) and CuPc (-0.004C)-PANI composite film (c), switched between −0.2 and 0.7 V for 10s at each step in 1 M H_2SO_4 aqueous solution. Kinetic optical transmittance and Responses time curves at 730 nm of CuPc (-0.002C)-PANI as shown in Fig.7 and Fig. 8 in revised manuscript.

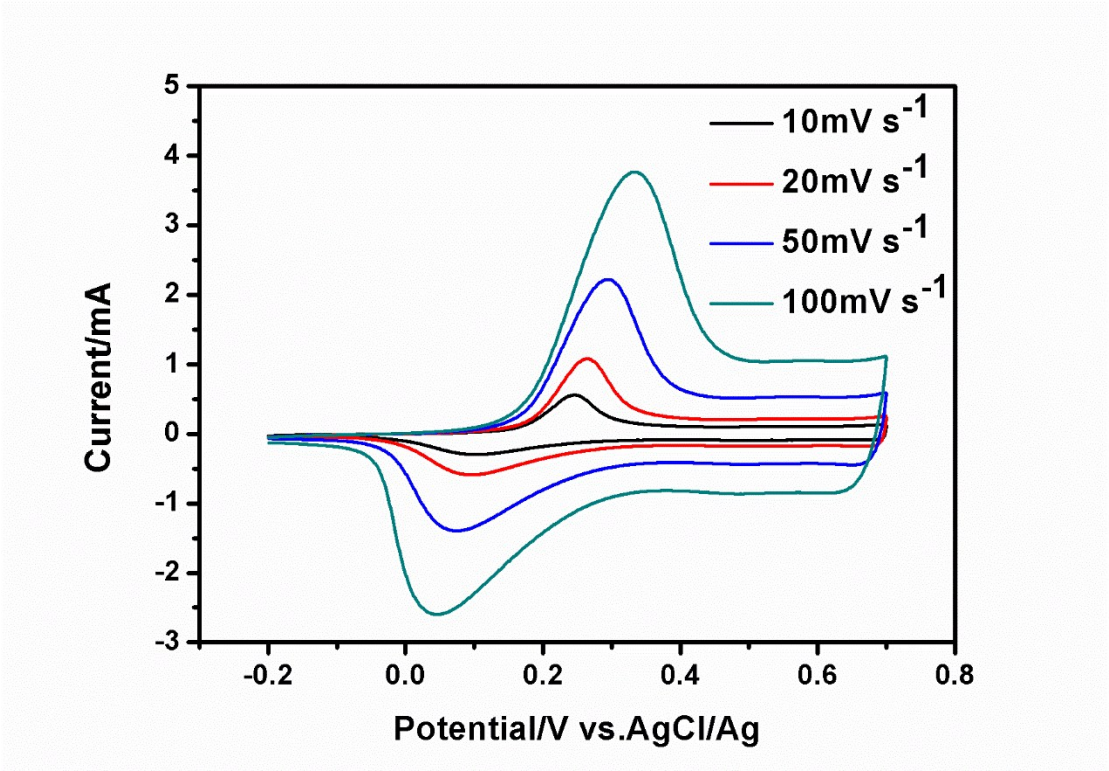

Fig. S3. Cyclic voltammetry curves of the CuPc-PANI composite film at various scan rates performed in 1 M H_2SO_4 electrolyte.