Supporting information

Photochromic and Super Anti-Wetting Coatings Based on Natural Nanoclays

Jie Dong,[a,b,c] Junping Zhang[a,b*]

[a] Center of Eco-material and Green Chemistry, and Key Laboratory of Clay Mineral Applied Research of Gansu Province, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, 730000, Lanzhou, P.R. China

[b] Center of Materials Science and Optoelectronics Engineering, University of Chinese Academy of Sciences, Beijing 100049, China

[c] State Key Laboratory of Solid Lubrication, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, 730000, Lanzhou, P.R. China

*Correspondence to jpzhang@licp.cas.cn

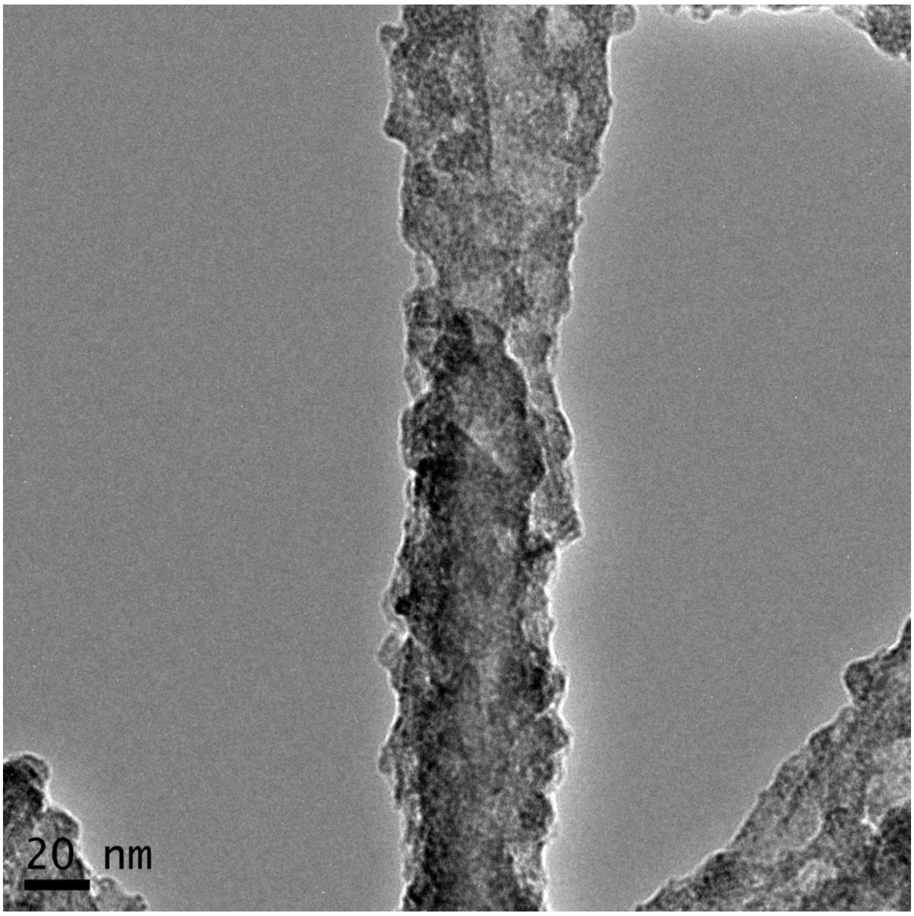

Fig. S1 TEM image of PAL/WO_3 at high magnification.

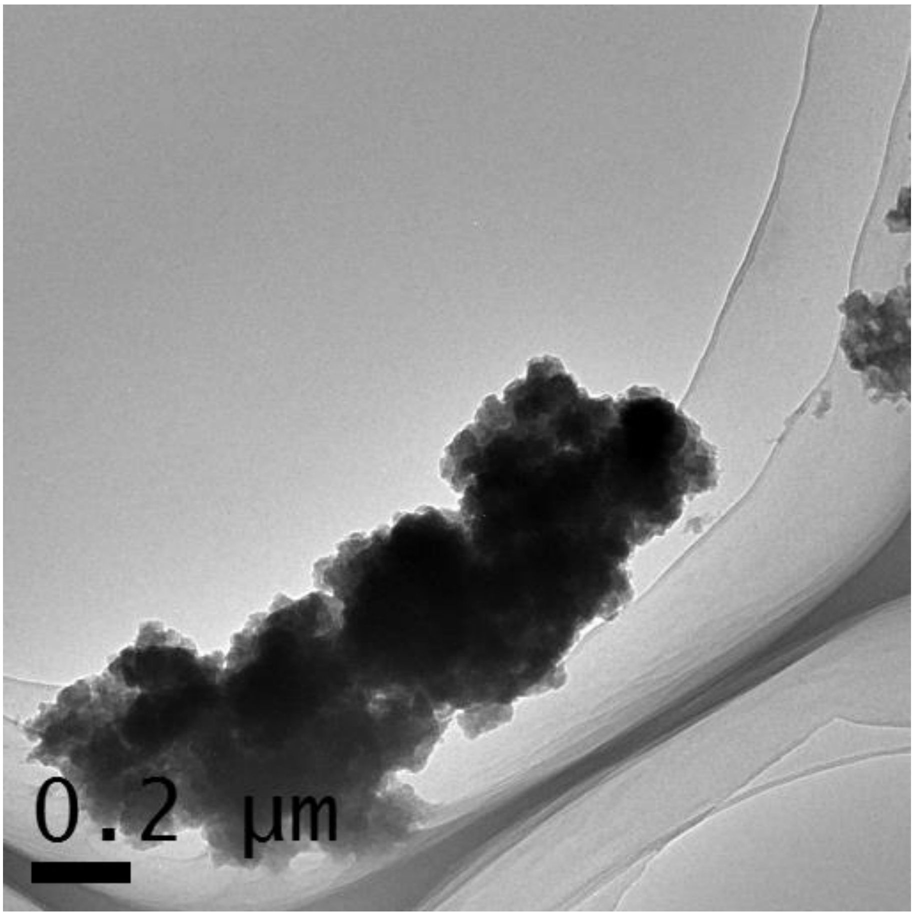

Fig. S2 TEM image of WO_3.

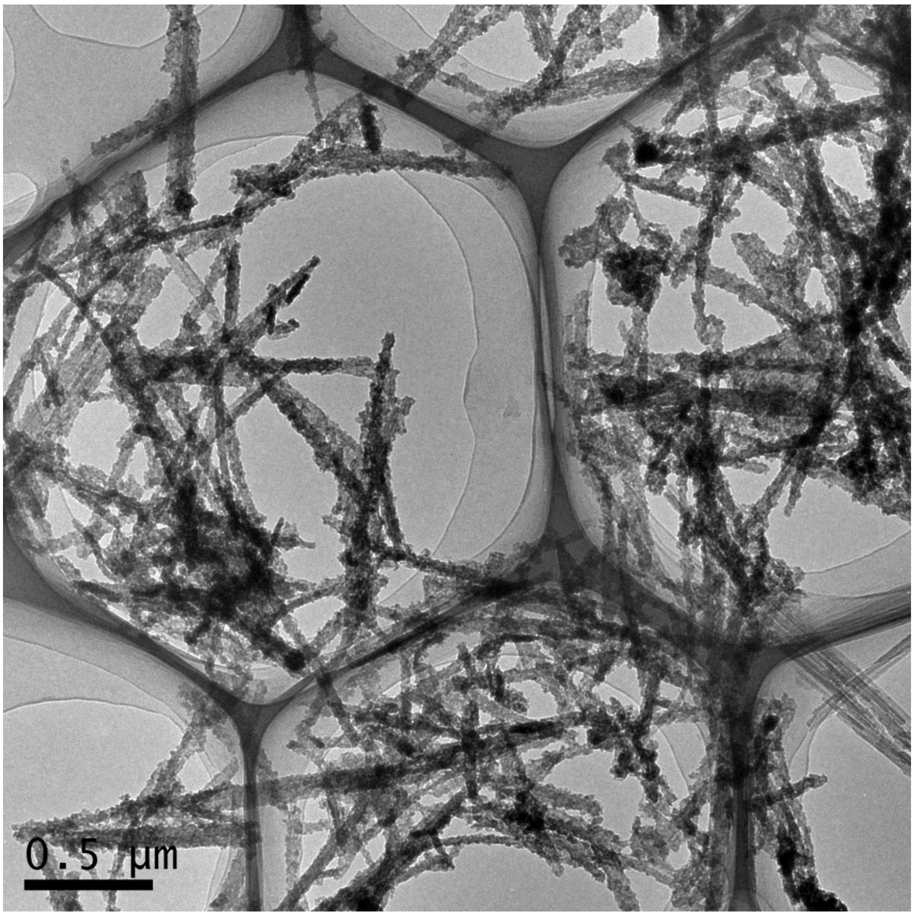

Fig. S3 TEM image of PAL/WO_3 at low magnification.

Table S1. Color parameters of the PAL/WO_3 coatings with different C_{PAL} after UV irradiation for 3 min.

C_{PAL} / (g L^{-1})	L*	a*	b*
0	3.68	1.23	-19.60
5	3.72	-6.96	-21.21
10	7.21	-6.71	-38.85
15	13.34	-8.56	-39.49
20	20.86	-9.37	-38.96
30	21.18	-8.37	-38.66
40	37.68	-7.15	-31.64

Table S2. Color parameters of the PAL/WO_3 coatings with different UV irradiation time. C_{PAL} = 20 g L^{-1}.

Time / s	L*	a*	b*
5	71.46	-5.45	-2.32
10	69.43	-6.68	-4.92
30	61.31	-7.62	-11.19
60	53.68	-8.16	-17.31
120	35.82	-8.62	-30.02
180	20.86	-9.37	-38.96

Table S3. Color parameters of the clay/WO_3 coatings based on different clays after UV irradiation for 3 min. C_{clay} = 20 g L^{-1}.

Samples	L*	a*	b*
Halloysite/WO_3	24.38	-6.84	-30.46
Sepiolite/WO_3	23.86	22.84	-38.83
Kaolinite/WO_3	38.33	-5.15	-26.14
Ca^{2+}-MMT/WO_3	19.75	3.77	-40.92
Laponite/WO_3	31.61	-5.08	-32.87

Fig. S4 Photographs of different clays.

Table S4. Chemical composition (wt.% oxides) of the clay samples measured by XRF.

Samples	SiO_2	Al_2O_3	MgO	TiO_2	K_2O
PAL	67.05	9.75	10.54	1.04	1.41
Halloysite	49.63	42.33	0.15	0.16	0.79
Sepiolite	72.06	3.15	21.34	0.18	1.09
Kaolinite	55.86	39.46	0.09	0.02	3.69
Ca^{2+}-MMT	70.95	14.93	1.83	0.52	0.38
Laponite	71.72	0.91	23.76	0.03	0.02

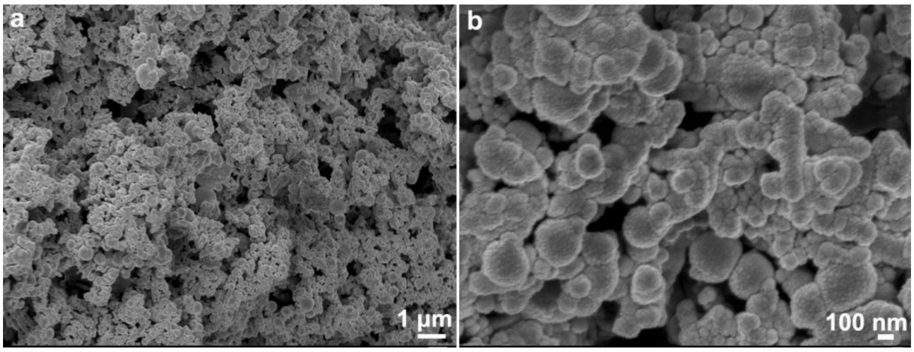

Fig. S5 (a-b) SEM images of the PAL/WO_3@M-POS coating. C_{PAL} = 20 g L^{-1}.

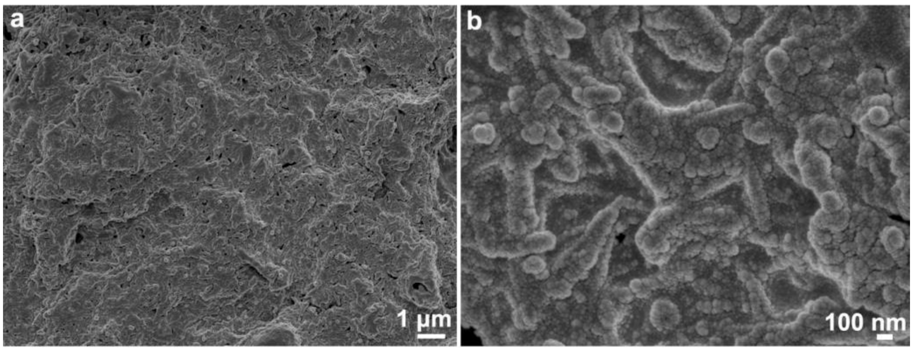

Fig. S6 (a-b) SEM images of the PAL/WO_3@fluoroPOS coating. C_{PAL} = 20 g L^{-1}.

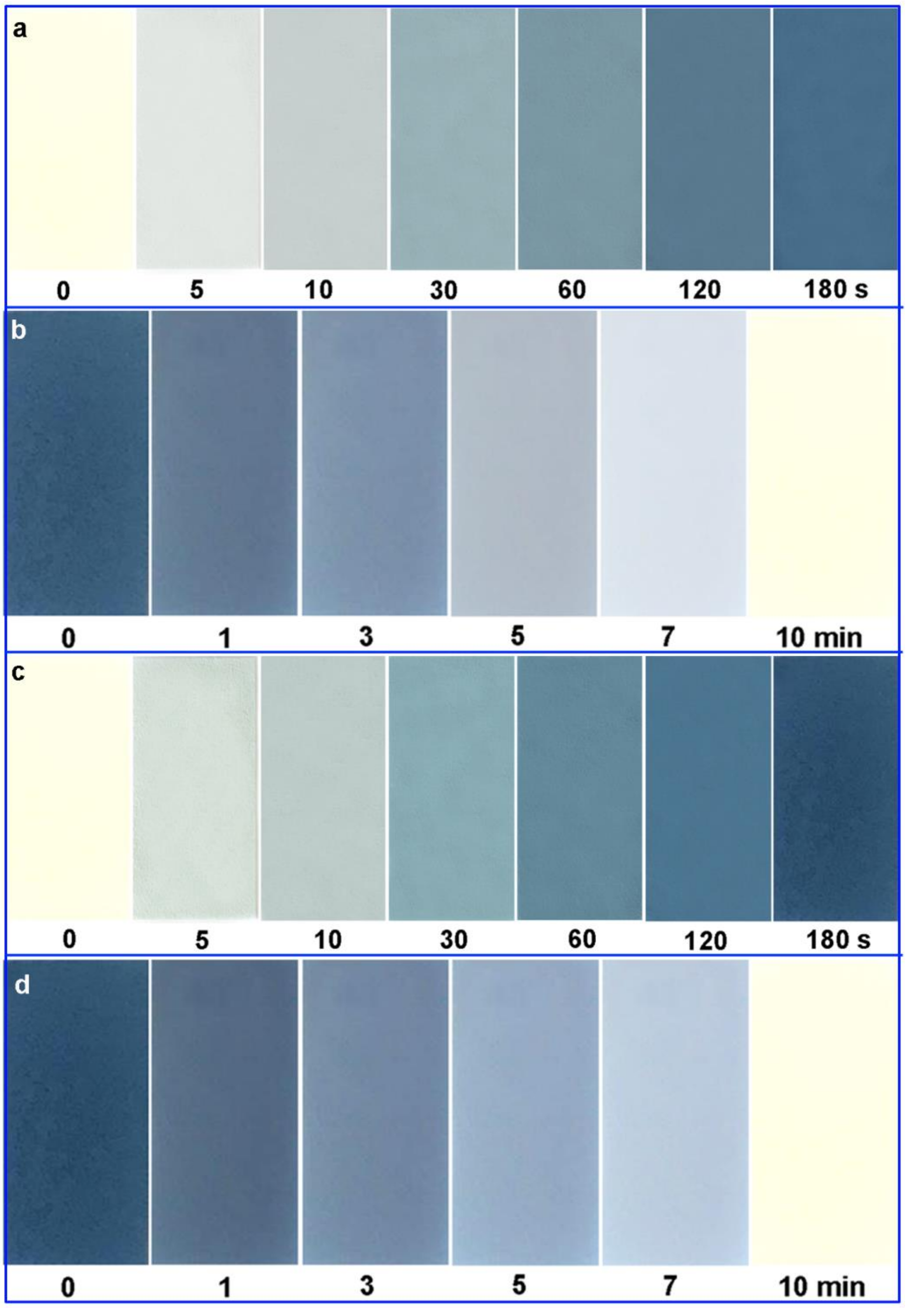

Fig. S7 Photographs showing (a) coloration process via UV irradiation and (b) decoloration process via heating at 60 °C of the PAL/WO_3@M-POS coating. Photographs showing (c) coloration process via UV irradiation and (d) decoloration process via heating at 60 °C of the PAL/WO_3@fluoroPOS coating. C_{PAL} = 20 g L^{-1}.

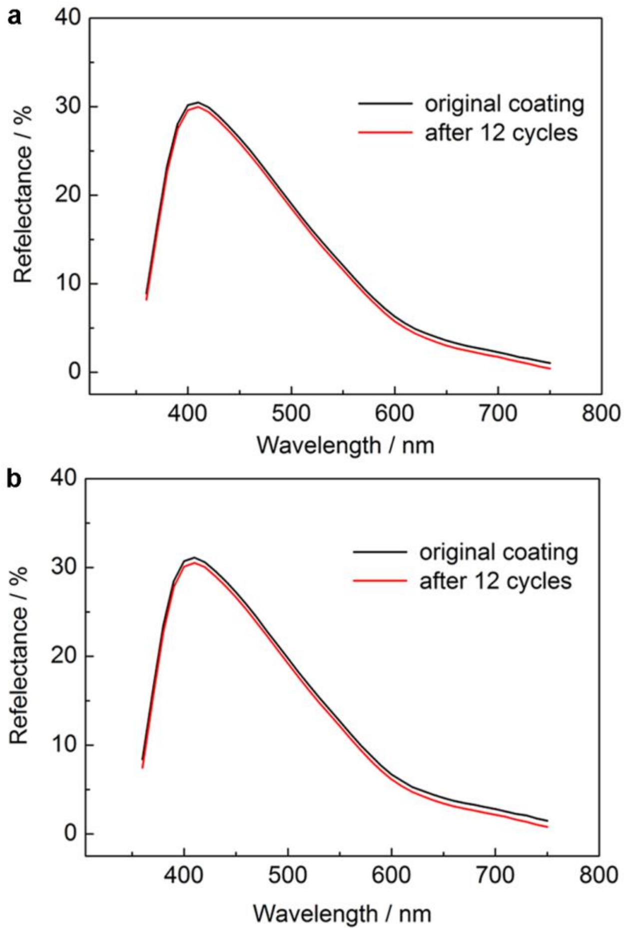

Fig. S8 DRV spectra of (a) PAL/WO_3@M-POS and (b) PAL/WO_3@fluoroPOS coatings after 12 coloration-decoloration cycles with the original coatings for comparison. C_{PAL} = 20 g L^{-1}.

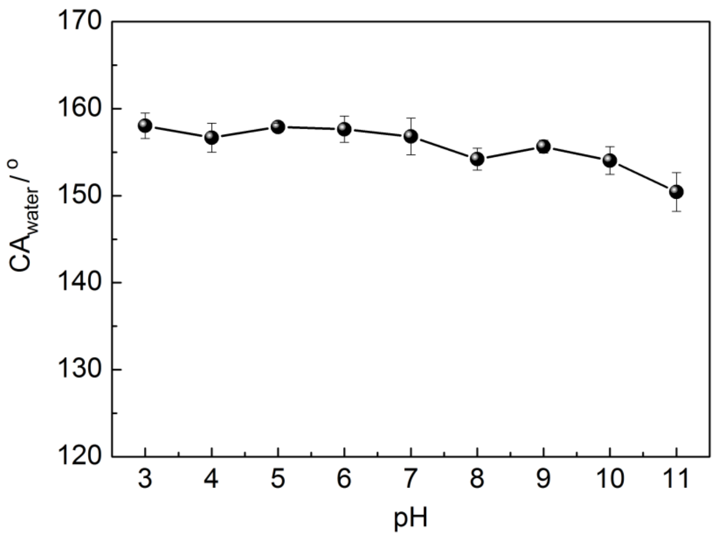

Fig. S9 CA_{water} of the PAL/WO_3@M-POS coating after immersion in pH 3-11 aqueous solutions for 1 h. C_{PAL} = 20 g L^{-1}.

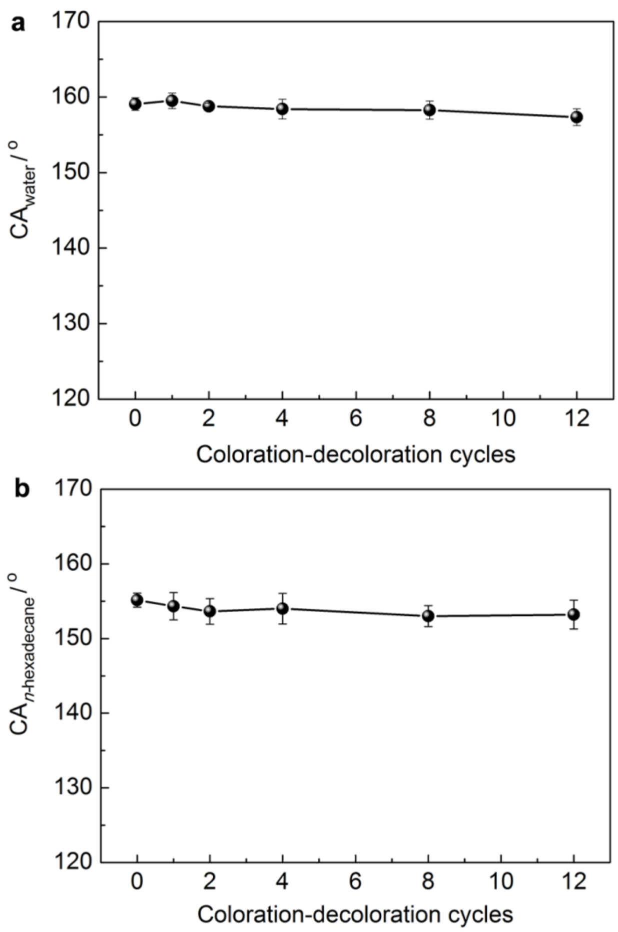

Fig. S10 (a) CA_{water} of the PAL/WO_3@M-POS coating in 12 coloration-decoloration cycles, (b) $CA_{n\text{-hexadecane}}$ of the PAL/WO_3@fluoroPOS coating in 12 coloration-decoloration cycles. C_{PAL} = 20 g L^{-1}.

Movie S1. Coloration of the PAL/WO_3 coating by UV irradiation. The play speed of the video is 3 times of the original.

Movie S2. Self-cleaning property of the PAL/WO_3@fluoroPOS coating.