# Electronic Supplementary Information for

# Fabrication of MMO/$TiO_2$ One-Dimensional Photonic Crystal and its Application as a Colorimetric Sensor

**Yibo Dou, Jingbin Han, Tengli Wang, Min Wei,* David G. Evans, and Xue Duan**

*State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029, P. R. China*

## CORRESPONDING AUTHOR FOOTNOTE

* Corresponding author. Phone: +86-10-64412131. Fax: +86-10-64425385. E-mail: weimin@mail.buct.edu.cn.

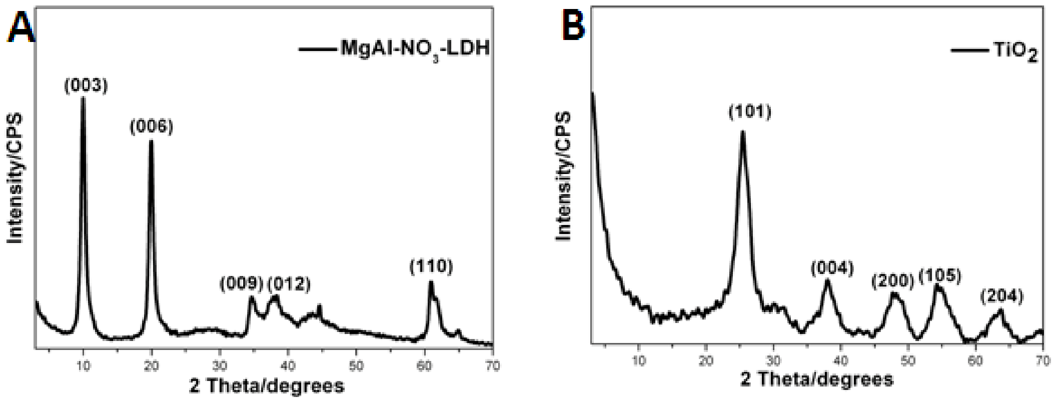


**Figure S1.** Powder XRD patterns of the (A) MgAl-$NO_3$ LDH and (B) $TiO_2$.

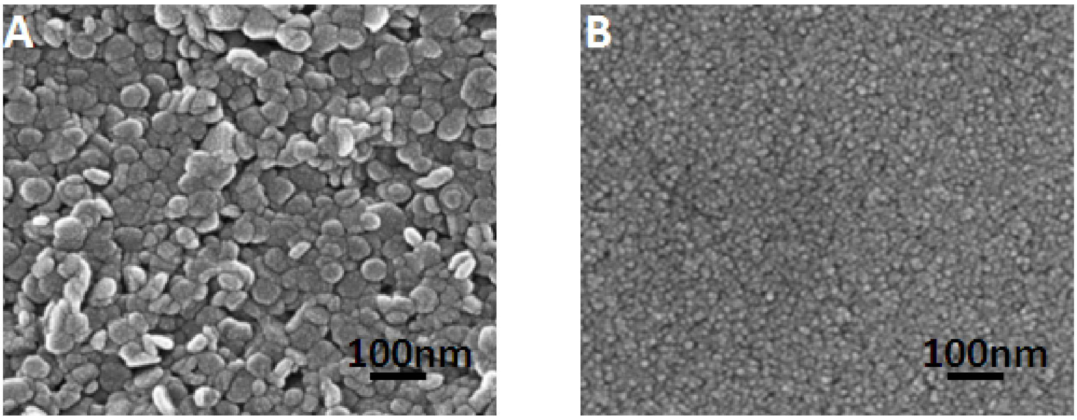


**Figure S2.** SEM images of the (A) MgAl-$NO_3$ LDH and (B) $TiO_2$.

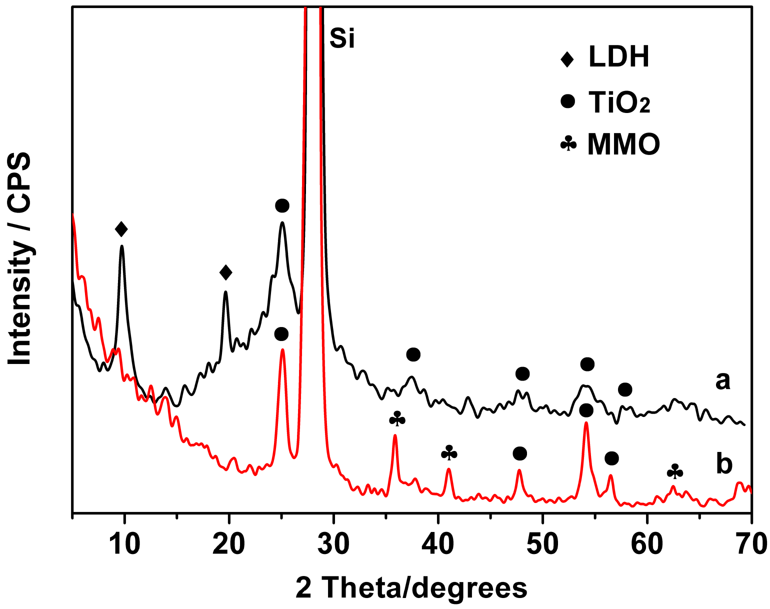


**Figure S3.** XRD patterns of the 1DPC film before (a) and after (b) calcination.

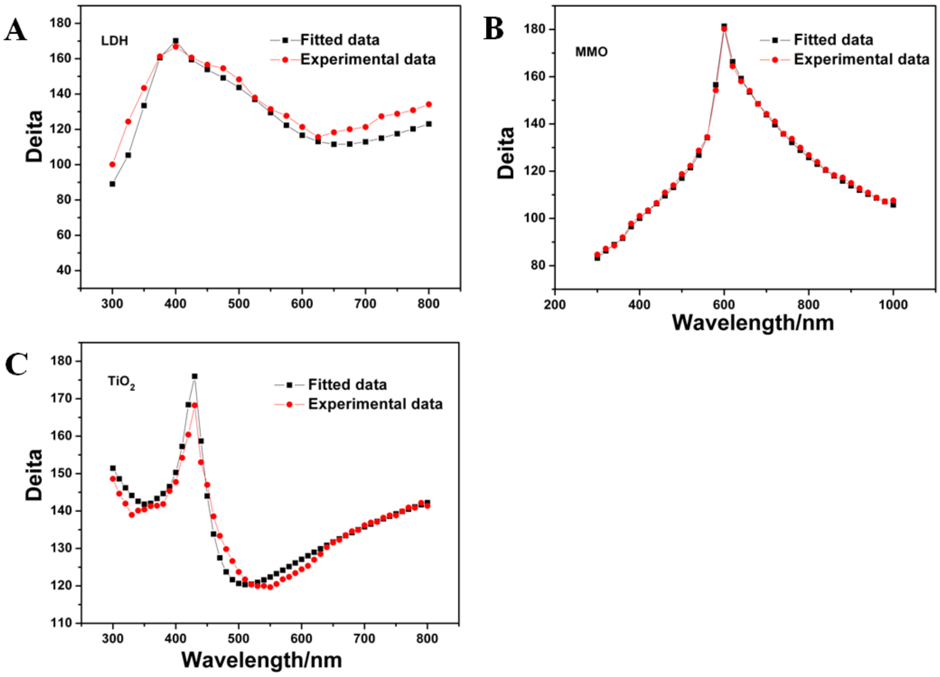


**Figure S4.** The experimental and fitted curves obtained by ellipsometric spectra for: (A) LDH, (B) MMO and (C) $TiO_2$.

The modeling and fitting of the ellipsometric spectra were performed using the software provided by the manufacturer. The data obtained were fitted to a Cauchy model, which assumes that the real part of the refractive index (*n*) can be described by:

$$n(\lambda) = \mathrm{A} + \frac{\mathrm{B}}{\lambda^2} + \frac{\mathrm{C}}{\lambda^4} \qquad (1)$$

where A, B and C are constants and $\lambda$ is the wavelength. The values of the refractive index reported in this work were determined at 633 nm.

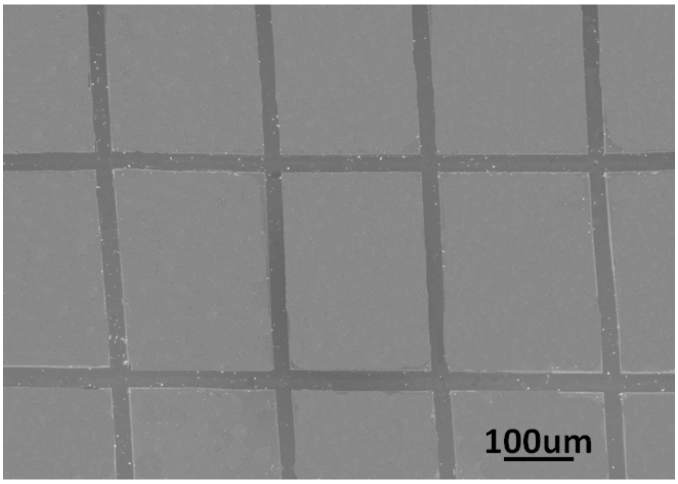


**Figure S5.** The MMO/$TiO_2$ film tested for adhesion.

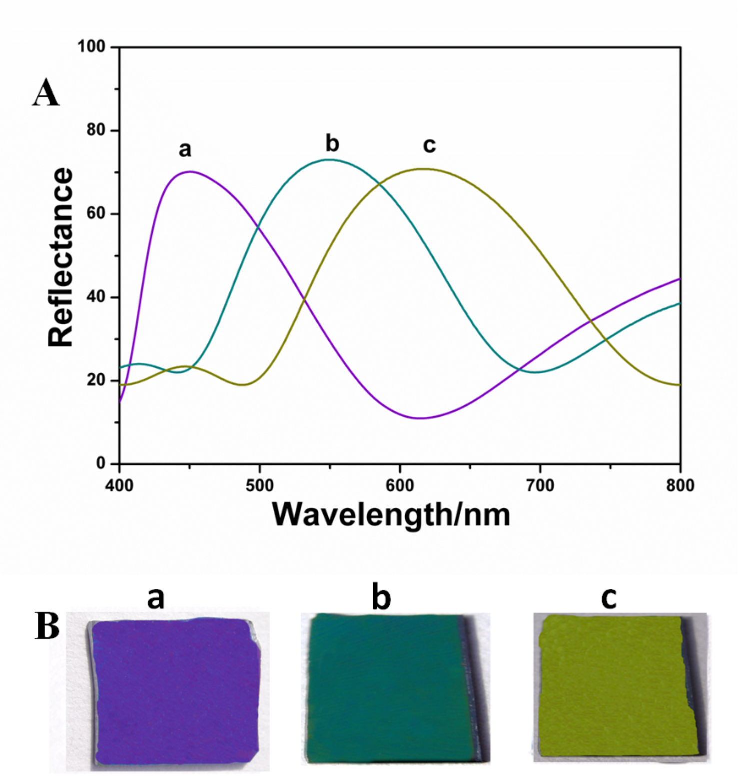


**Figure S6.** (A) Optical spectra and (B) digital photographs showing full visible range colors by thickness modulation of three 1DPC samples $(MMO/TiO_2)_n$ ($n$=6) (the thickness of $TiO_2$ is constant with 76 nm and the thickness of MMO are 70, 106 and 133 nm for a, b and c respectively).

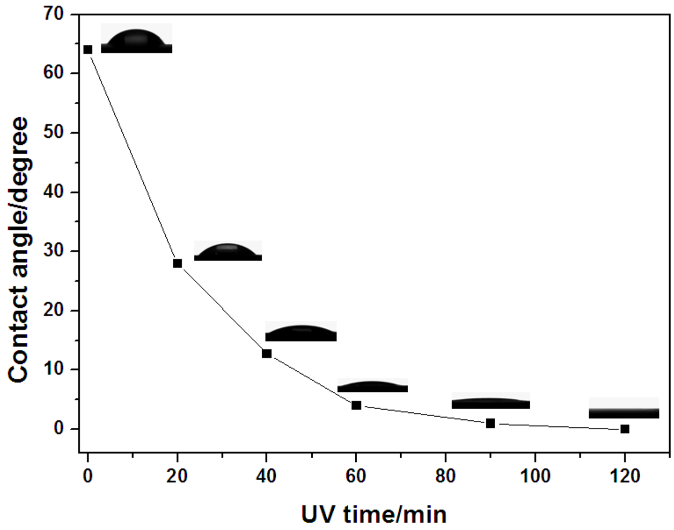


**Figure S7.** The change of water-contact angle for the $(MMO/TiO_2)_6$ 1DPC as a function of UV irradiation time.

The UV-illuminated humidity sensor shows self-cleaning property. As show in Figure S7, the surface of the $(MMO/TiO_2)_6$ 1DPC contaminated with oleic acid displays a contact angle of 64° initially. Upon UV irradiation, its contact angle decreases grdually to ~0° after 120 min, facilitating a fast spread of water droplet. Therefore, the 1DPC film displays self-cleaning property, possibly owing to the photocatalytic degradation of contaminant *via* $TiO_2$.