## Supporting information

## Flexible Metal–Organic Framework-based One-dimensional Photonic Crystals<sup>†</sup>

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Figure S1: X-ray diffraction patterns of as-synthesized NH<sub>2</sub>-MIL-88B nanoparticles (left); TiO<sub>2</sub> annealed at 550  $^{\circ}$ C 1h in air (right) compared to simulated data.



Figure S2: SEM image of as-synthesized NH<sub>2</sub>-MIL-88B nanoparticles (left) and TEM image of TiO<sub>2</sub> sol (right).



Figure S3: FT-IR spectra of NH<sub>2</sub>-MIL-88B nanoparticles (left) and titania nanoparticles (right).



Figure S4: the generated and experimental data of NH<sub>2</sub>-MIL-88B monolayer using spectroscopic ellipsometry, MSE=75.



Figure S5: the generated and experimental data of  $TiO_2$  monolayer using spectroscopic ellipsometry, MSE=18.



Figure S6: Reflection spectra shift 1DPCs on exposure to EtOH.



Figure S7: Reflection spectra shift 1DPCs on exposure to Acetone.



Figure S8: Reflection spectra shift 1DPCs on exposure to MeOH.



Figure S9: Reflection spectra shift 1DPCs on exposure to H<sub>2</sub>O.



Figure S10: Reflection spectra shift 1DPCs on exposure to i-PrOH.



Figure S11: Reflection spectra shift 1DPCs on exposure to DMF.



Figure S12: The Experimental and Fit curves of flexible MOF film (A) before and (B) after absorbing ethanol vapor. (C) The reflectance spectra of flexible MOF film before and after absorbing ethanol vapor.

Ellipsometry were used to estimate the thickness and RI of the flexible MOF film before and after absorbing ethanol vapor. The thickness changed from 293 nm to 372 nm, while the RI changed from 1.018 to 1.000 (Figure S12 A and B). The corresponding spectra were shown in Figure S12C, peak shifted from 653 to 776 nm. The thickness and RI of the flexible MOF film can be changed simultaneously when it was exposed to guests. The change in thickness is the main effect factor on the peak shift.



Figure S13: The reflectance spectra and photographs of (MIL-101/TiO<sub>2</sub>)<sub>4</sub> and (ZIF-8/TiO<sub>2</sub>)<sub>4</sub> 1DPC.



Figure S14: Photographs of 1DPCs origin(a); after 4 months(b); 200 °C for 20min(c); sonication for 0.5 h(d) treatments.



Figure S15: The reflectance spectra of 1DPC shift and recovering after exposed to organic vapors.