Supporting Information

Photoinduced Charge Transfer Processes on MOF-5 Nanoparticles: Elucidating Differences between Metal-Organic Frameworks and Semiconductor Metal Oxides

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Figure S1. Powder XRD patterns obtained for freshly prepared MOF-5 nanoparticles (MOF-5\_n) (a), MOF-5\_n exposed to ambient air for a couple of days (b), and water-treated MOF-5\_n (MOF-5\_aq) (c). Asterisks indicate new peaks after water treatment. Blue bars are the XRD pattern for MOF-5.\textsuperscript{S1,S2}

Figure S2. TEM image of ZnO nanoparticles. The average diameter is determined to be around 4 nm. Inset shows the diffraction pattern.
Figure S3. ATR-FTIR spectra of MOF-5_n (a) and MOF-5_aq (b) powders. See reference S2 for peak assignments.

Figure S4. Change of emission spectra of MOF-5_n slurried in acetonitrile (1 ml) by the addition of water.
Figure S5. (a) Steady-state PL spectrum of MOF-5\_aq in acetonitrile. (b) PL decays obtained for MOF-5\_aq in acetonitrile in the absence (black) and presence of TEA.
Figure S6. (A) Steady-state absorption, fluorescence, and phosphorescence spectra of terephthalate in alkaline water ([NaOH] = 2 mM). (B) Fluorescence decays obtained for terephthalate in alkaline water ([NaOH] = 2 mM) in the absence (black) and presence of TEA. Inset shows the TEA concentration dependence of the observed decay rates ($k_{obs}$).
**Figure S7.** (A) Steady-state fluorescence ($\lambda_{\text{ex}} = 315$ nm) and fluorescence excitation ($\lambda_{\text{em}} = 430$ nm) spectra of the solution of terephthalate in alkaline water ([NaOH] = 2 mM) before (black lines) and after UV irradiation. (B) Fluorescence decays obtained for terephthalate in alkaline water after UV irradiation, i.e., 2-hydroxyterephthalate, in the absence (black) and presence of TEA. Inset shows the TEA concentration dependence of the observed decay rates ($k_{\text{obs}}$).
Figure S8. Steady-state PL ($\lambda_{\text{ex}} = 315$ nm) and PL excitation ($\lambda_{\text{em}} = 440$ nm) spectra of MOF-5\_aq powder slurried in acetonitrile before (black lines) and after UV irradiation.
Figure S9. (A) TDR spectra observed at 5, 20, and 50 μs after the laser flash during the 355-nm laser photolysis of the MOF-5_n powder slurried in acetonitrile in the presence of thioanisole (TA) (1.4 M). The σ- and π-type dimer radical cations (TA_2^{•+}) were observed. (B) TDR spectra observed at 5, 20, and 50 μs after the laser flash during the 355-nm laser photolysis of the MOF-5_n powder slurried in acetonitrile in the presence of DABCO (0.1 M). The DABCO radical cation (DABCO^{•+}) was observed.
**Figure S10.** (A) TDR spectra observed at 0.5, 5, and 30 μs after the laser flash during the 355-nm laser photolysis of the MOF-5_n powder slurried in water (pH 7) in the presence of methyl viologen (MV^{2+}) (10 mM). The blue solid line indicates the absorption spectrum of MV^{•+} in water.\(^{55}\) (B) Time traces observed at 605 and 750 nm in the absence and the presence of MV^{2+} (10 mM).
References


