Electronic Supplementary Information (ESI) for:

Micro-/Nano-Sized Multifunctional Heterochiral Metal-Organic Frameworks for High-Performance Visible-Blind UV Photodetectors

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Supplementary Contents

Supplementary Figures

Estimation of electrical conductivity and optoelectronic parameters

The electrical conductivity of MOFs was calculated from two-probe method using the following equation:

$$\sigma = G\frac{l}{A} = \frac{I}{V} \times \frac{l}{A} \qquad \text{(S1)}$$

where G is electrical conductance, and l and A are length and area of the conduction channel, respectively. The length and area of the conduction channel were measured using the SEM image of AlaNDI-Ca micro-/nanocrystals.

To investigate the possible optoelectronic applications of our heterochiral AlaNDI-Ca MOFs micro-/nanocrystals, the R and P values were calculated from I-V curves before and after UV light irradiation. These are typically defined by the following equations:

$$R = \frac{I_{\mathrm{ph}}}{P_{\mathrm{inc}}} = \frac{I_{\mathrm{light}} - I_{\mathrm{dark}}}{P_{\mathrm{inc}}} \qquad \text{(S2)}$$

$$P = \frac{I_{\mathrm{light}} - I_{\mathrm{dark}}}{I_{\mathrm{dark}}} \qquad \text{(S3)}$$

where I_{ph} is the photocurrent, P_{inc} is the incident illumination power on the channel of the device, I_{light} is the current under illumination, and I_{dark} is the current in the dark.

In addition, the EQE of these resistor-type photodetectors, defined as the ratio of the number of photogenerated carriers to the number of photons incident on the photodetector channel area, was calculated using the following equation:

$$\eta = \frac{(I_{light} - I_{dark})hc}{eP_{int}A\lambda_{peak}} \qquad \text{(S4)}$$

where h is Plank's constant, c is the speed of light, e is the fundamental unit of charge, P_{int} the incident power density, A is the area of the detector channel, and λ_{peak} is the peak wavelength of the incident light, respectively. The channel area was confirmed from the optical microscope images of individual MOF crystals. The λ_{peak} of the illuminated light source was 365 nm and the incident optical power density was 150 μW cm^{-2}.

Furthermore, D^* is an important figure of merit for photodetectors. D^* describes the smallest detectable signal and allows for comparison between photodetector devices with different configurations and active areas. D^* is estimated for our heterochiral MOF-based photodetectors using the following equations:

$$D^* = \frac{\sqrt{A}}{NEP} \tag{S5}$$

$$NEP = \frac{\sqrt{\overline{I_n^2}}}{R} \tag{S6}$$

where A is the active area of the photodetector, NEP is the noise equivalent power, and $\overline{I_n^2}$ is the measured noise current. If shot noise from the dark current is the major contributor to the noise that limits detectivity, then D^* can be simplified to:

$$D^* = \frac{R}{\sqrt{(2e \cdot I_{dark}/A)}} \tag{S7}$$

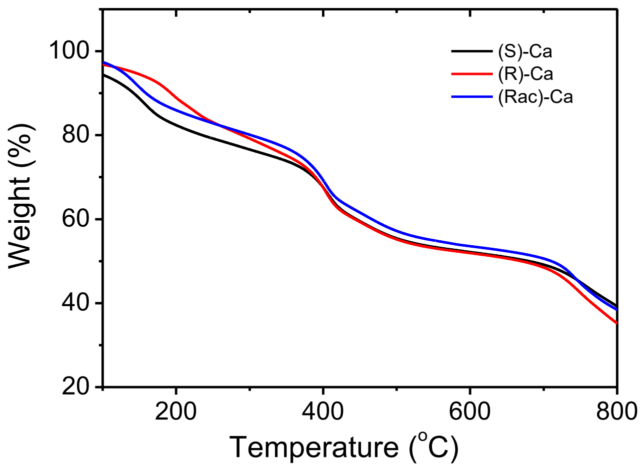
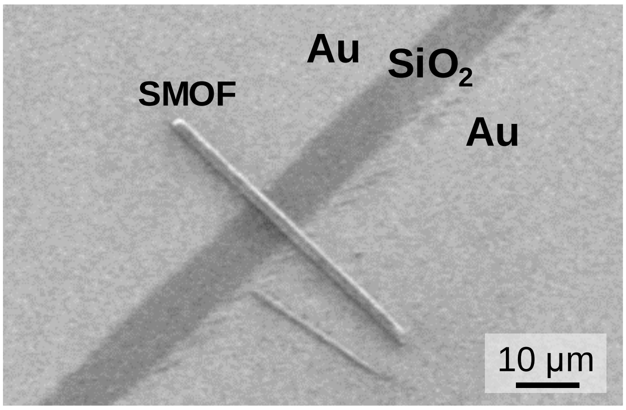


Fig. S1 TGA curves of homochiral and heterochiral AlaNDI-Ca MOFs.



Fig, S2 SEM images of (*Rac*)-AlaNDI-Ca MOFs on pre-patterned gold electrodes in electronic devices.

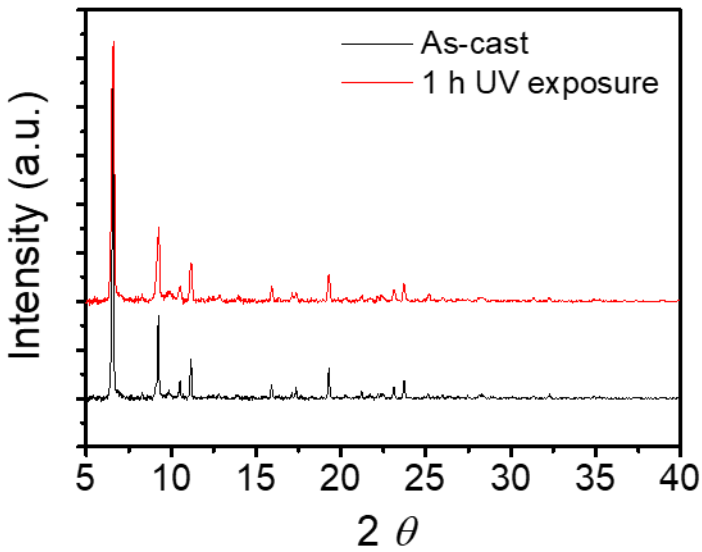


Fig. S3 PXRD results of heterochiral AlaNDI-Ca MOFs before and after exposure to UV light (λ = 365 nm, 150 μW cm^{-2}) for 1 h.

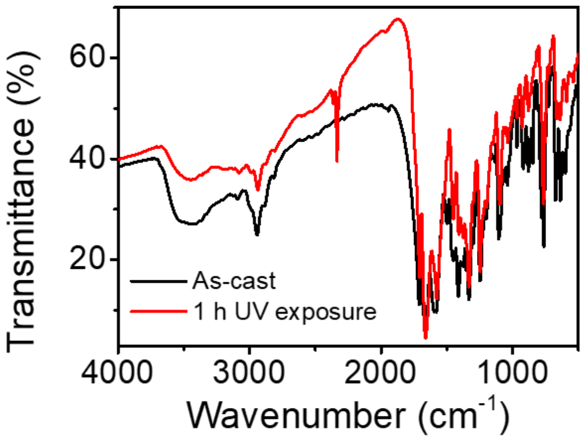


Fig. S4 IR results of heterochial AlaNDI-Ca MOFs before and after exposure of UV light (λ = 365 nm, 150 μW cm^{-2}) for 1 h.

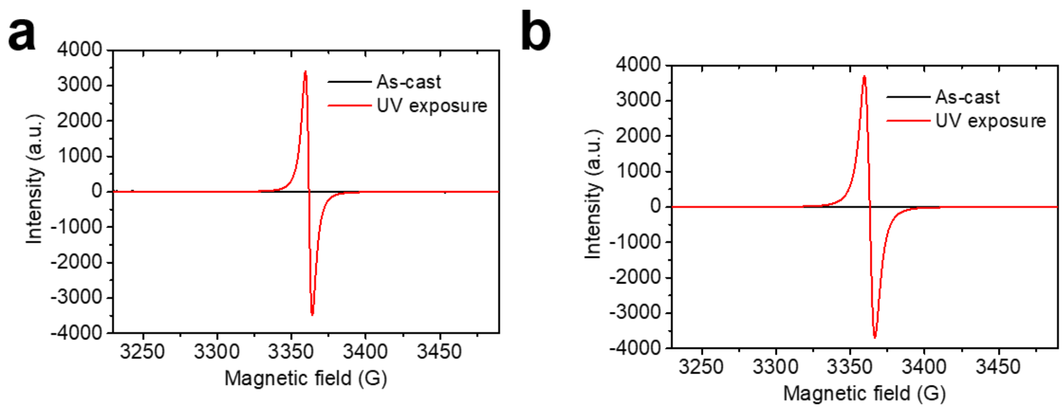


Fig. S5 ESR results of homochiral (**a**) (*R*)- and (**b**) (*S*)-AlaNDI-Ca MOFs before and after exposure to UV light (λ = 365 nm, 150 μW cm^{-2}) for 1 h.

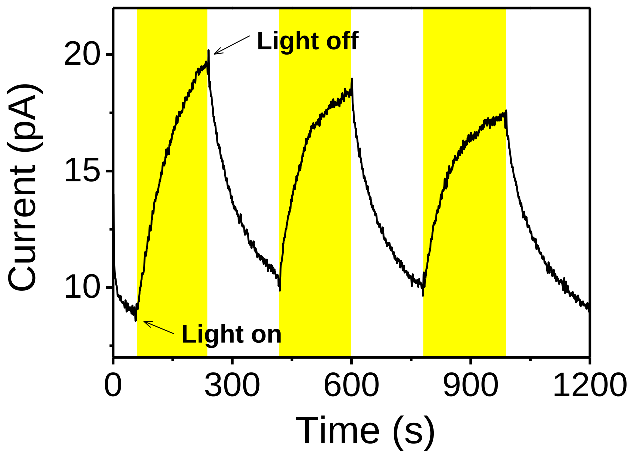


Fig. S6 Time-dependent conductivity changes of heterochiral (*Rac*)-AlaNDI-Ca MOFs under UV light (λ = 365 nm, 150 μW cm^{-2}) for repetitive photoswitching test.