

## Rate-determining process in MISIM photocells for optoelectronic conversion using photo-induced pure polarization current without carrier transfer across interfaces

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Fig S1. Measurement setup and device structure.

Fig S2. Photoresponses of SiPD for the modulated light at various frequencies.

Fig. S3. Photocurrent in the DA (red) and AD photocell (blue) with (a) Cu and (b) Ag top electrodes.

Fig. S4. Frequency dependence of the photocurrent for the [ITO|PC|ZnPc|C<sub>60</sub>|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

Fig. S5. Frequency dependence of the photocurrent for the [ITO|PC|C<sub>60</sub>|ZnPc|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

Fig. S6. Time trajectories of the photocurrent for the AD photocell at various frequencies under illumination (a) and in the dark (b).

Fig. S7 Frequency dependence of the polarization for the [ITO|PC|ZnPc|C<sub>60</sub>|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

Fig. S8. Frequency dependence of the polarization for the [ITO|PC|C<sub>60</sub>|ZnPc|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

Fig. S9. Time dependence of the polarization change  $\Delta P$  for the AD photocell at various frequencies under illumination (a) and in the dark (b).

Fig. S10 Frequency dependence of  $\Delta P_{\max}/\Delta P_{\text{sat}}$  in a linear (a) and a log scale (b).

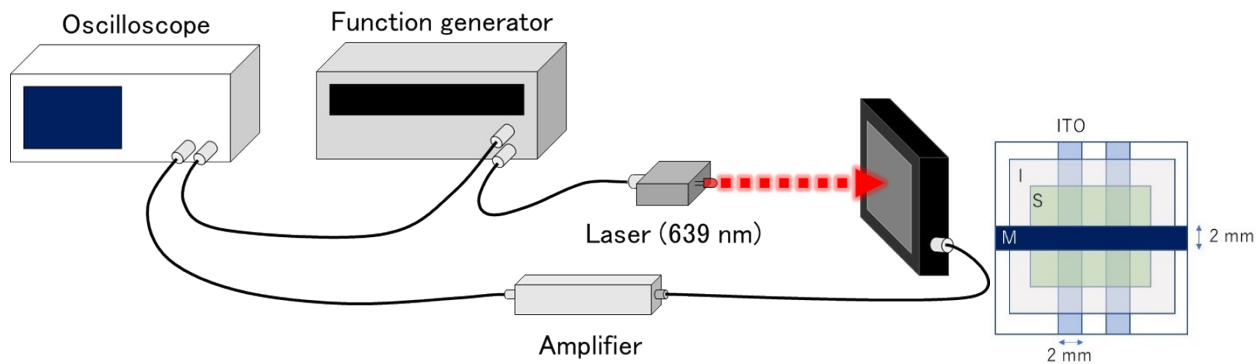


Fig. S1. Measurement setup and device structure.

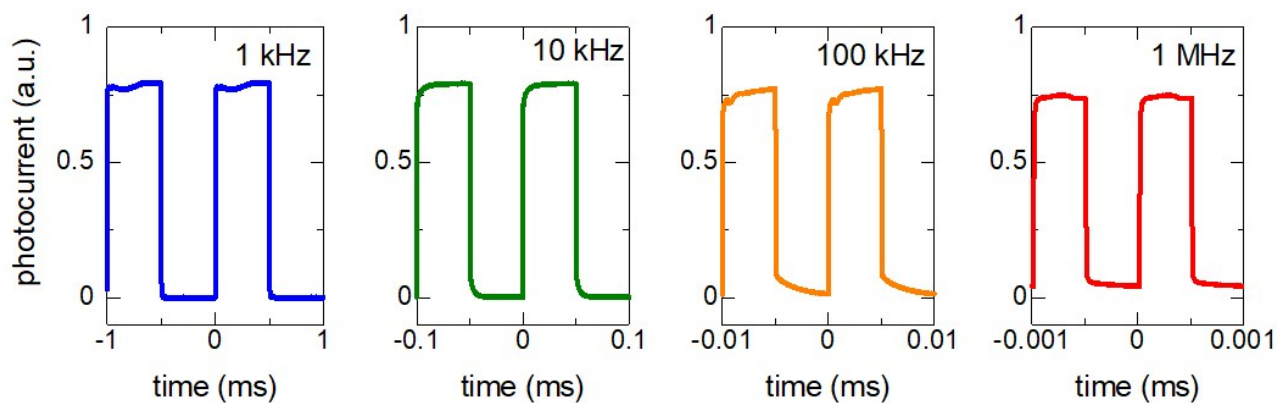


Fig. S2. Photoresponses of SiPD for the modulated light at various frequencies.

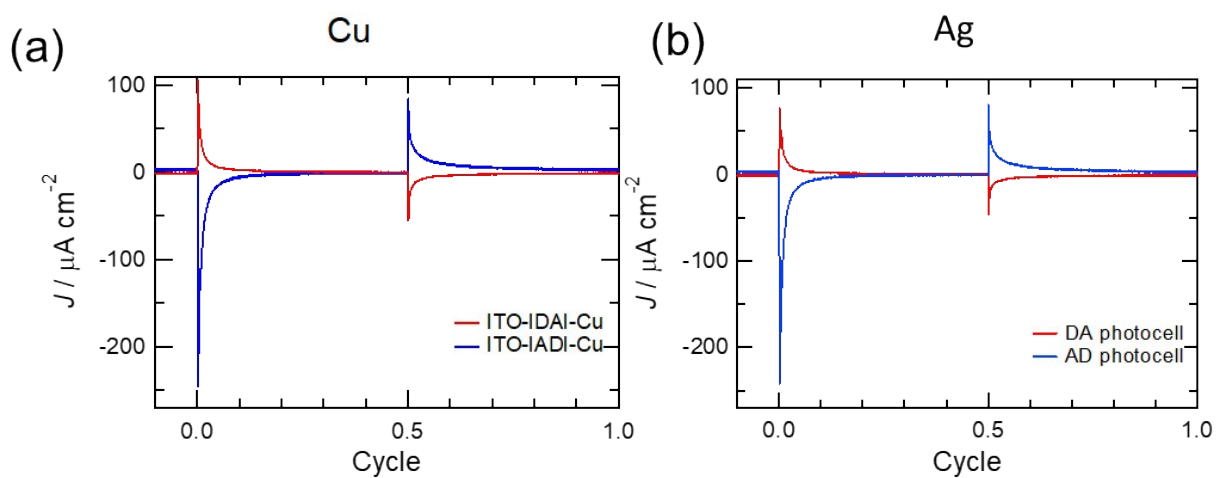
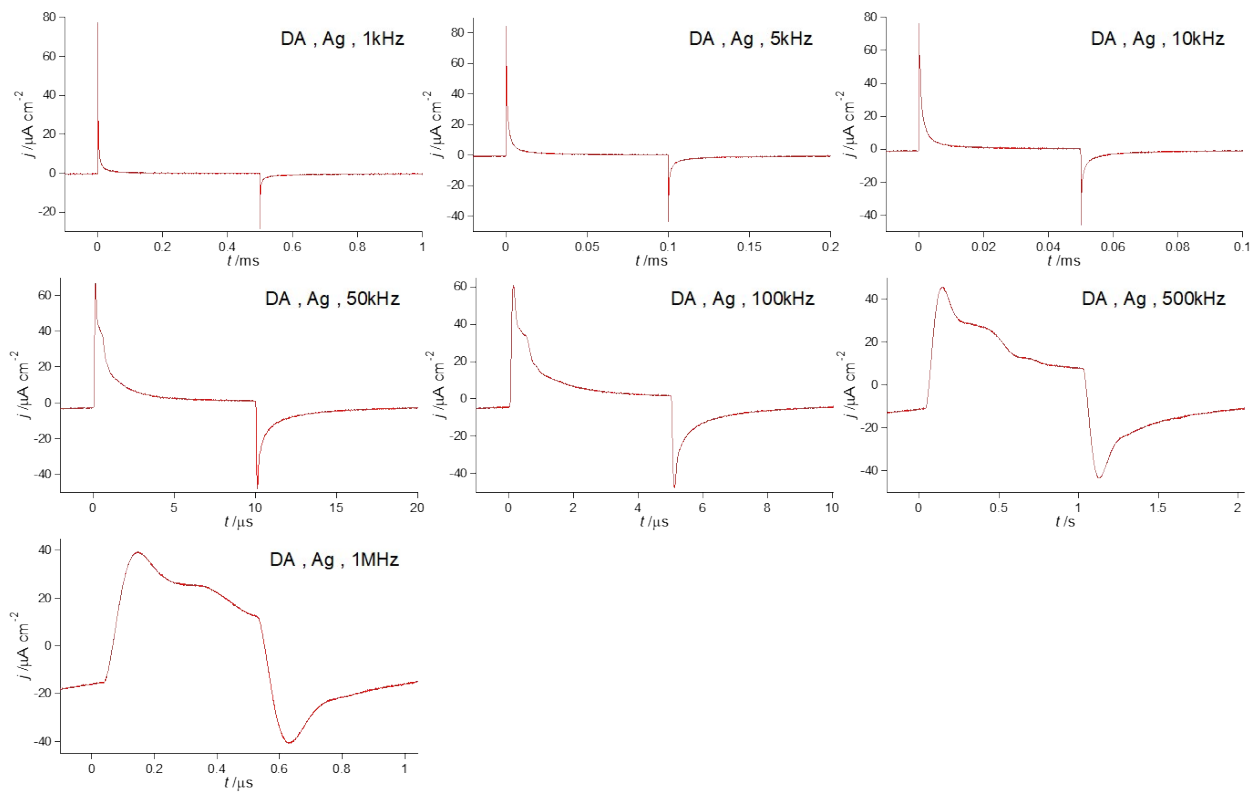
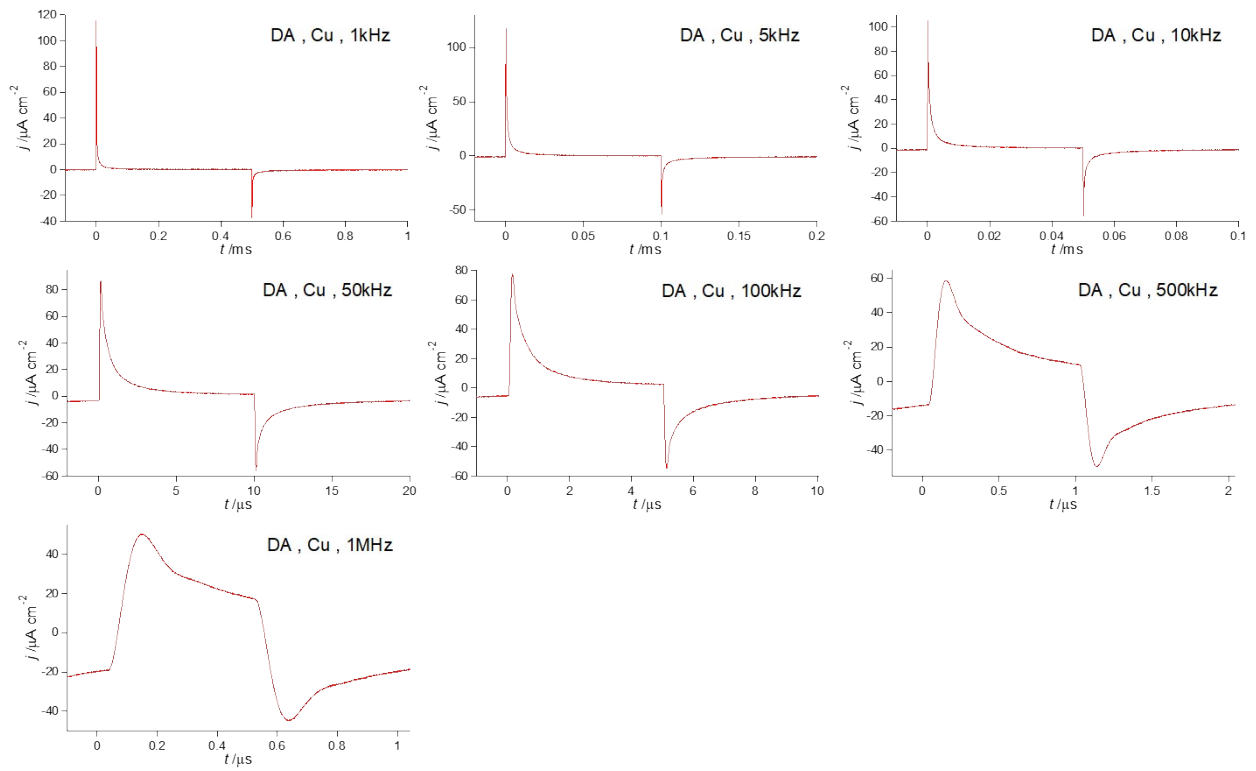


Fig. S3. Photocurrent in the DA and AD photocells with the Cu (a) and Ag (b) top electrodes.

(a) Ag



(b) Cu



(c) Au

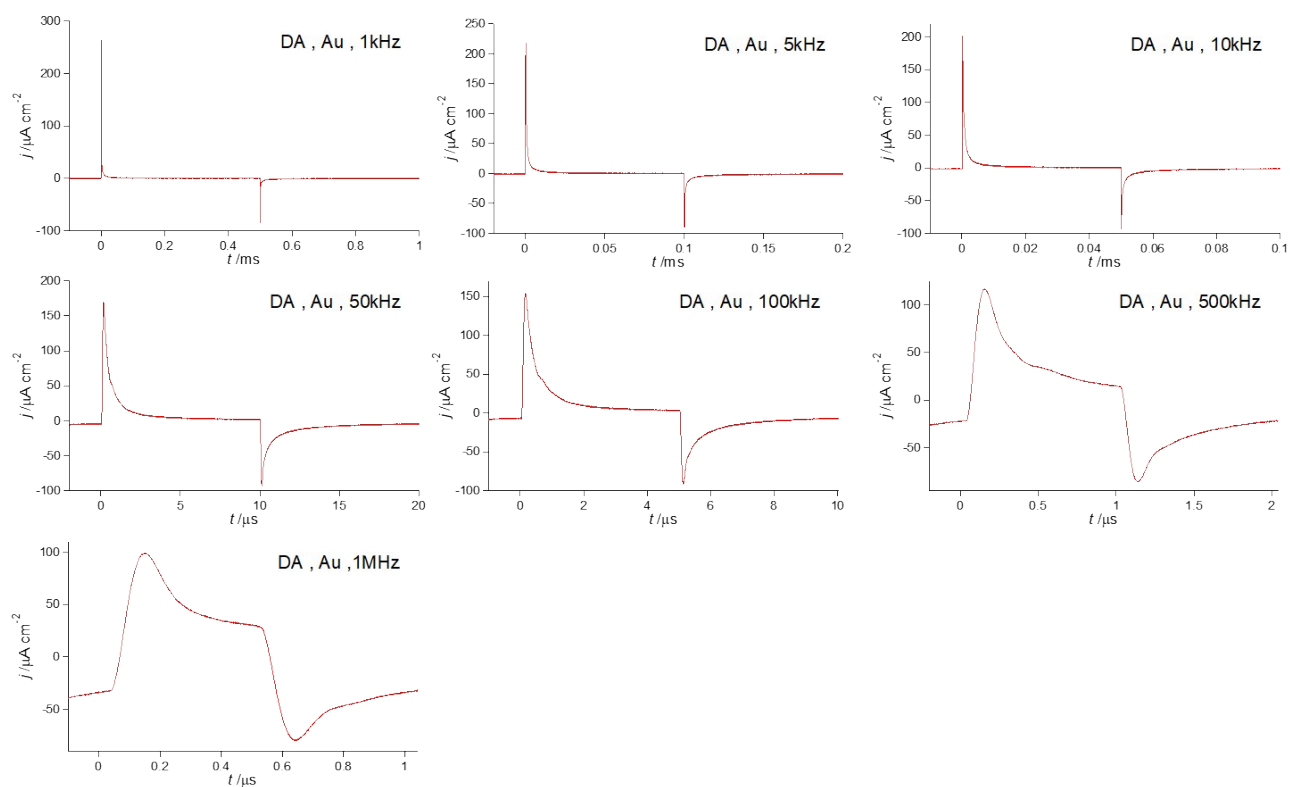
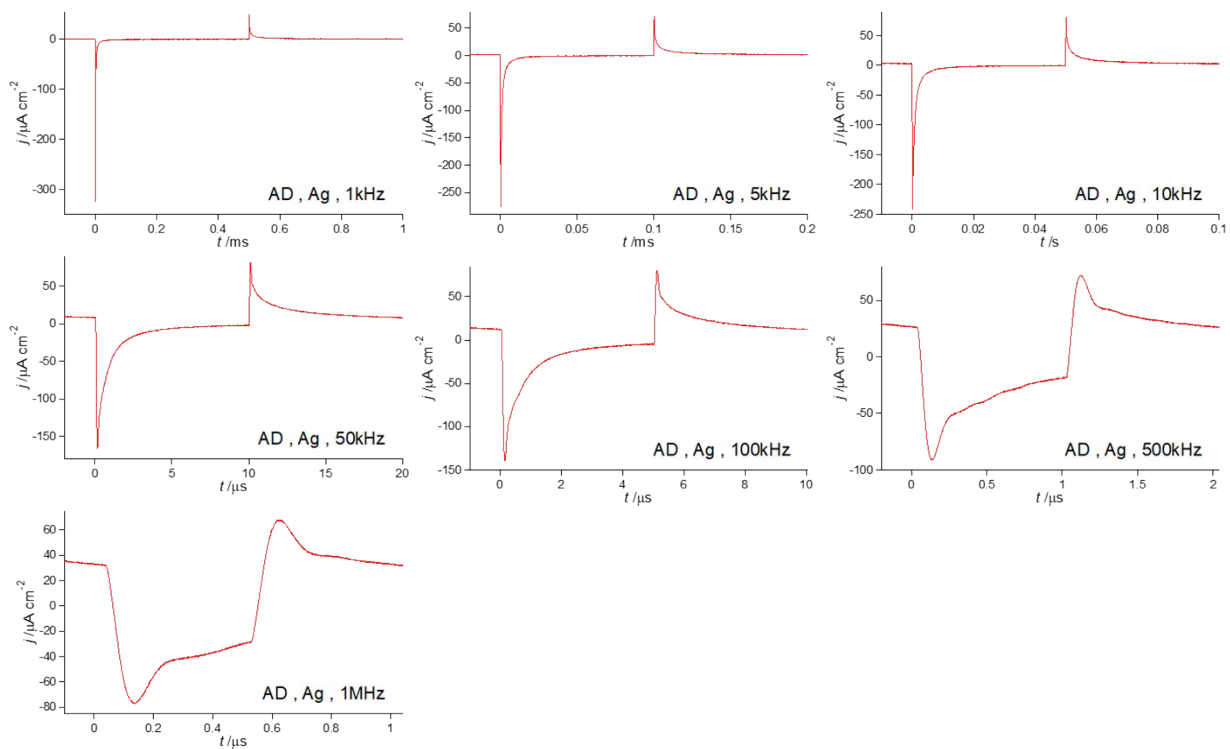
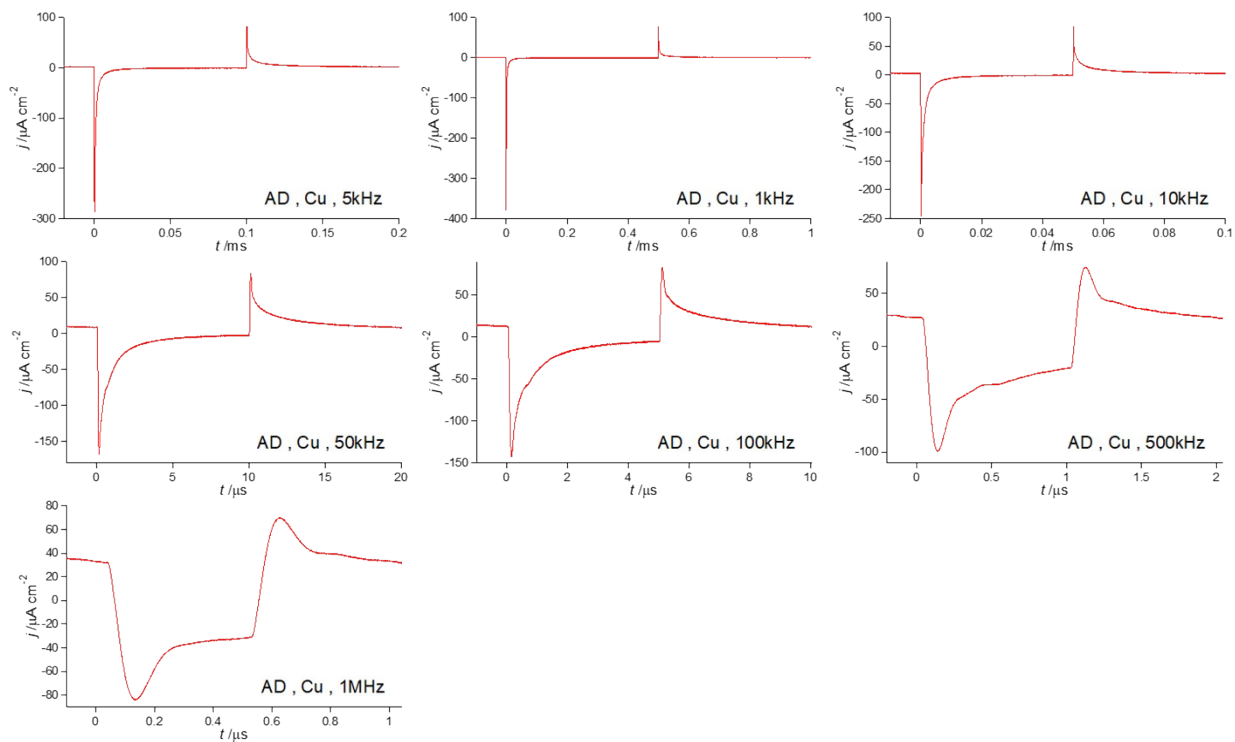


Fig. S4. Frequency dependence of the photocurrent for the [ITO|PC|ZnPc|C<sub>60</sub>|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

(a) Ag



(b) Cu



(c) Au

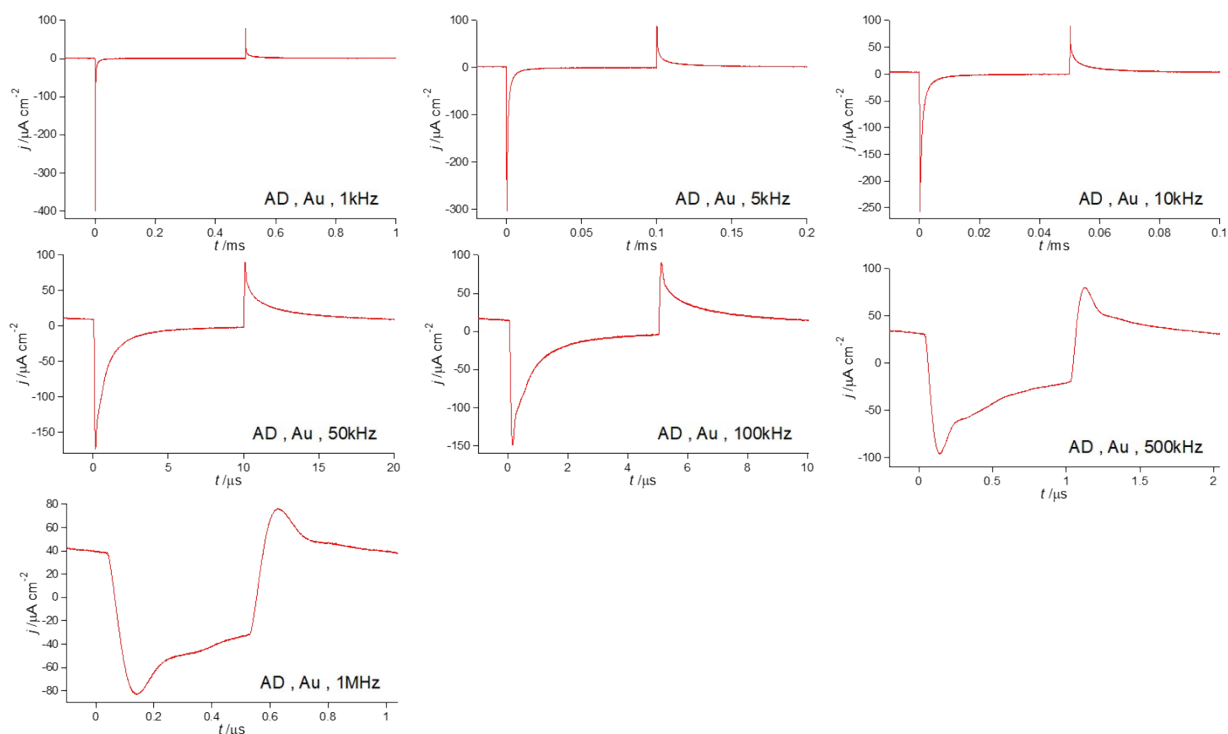
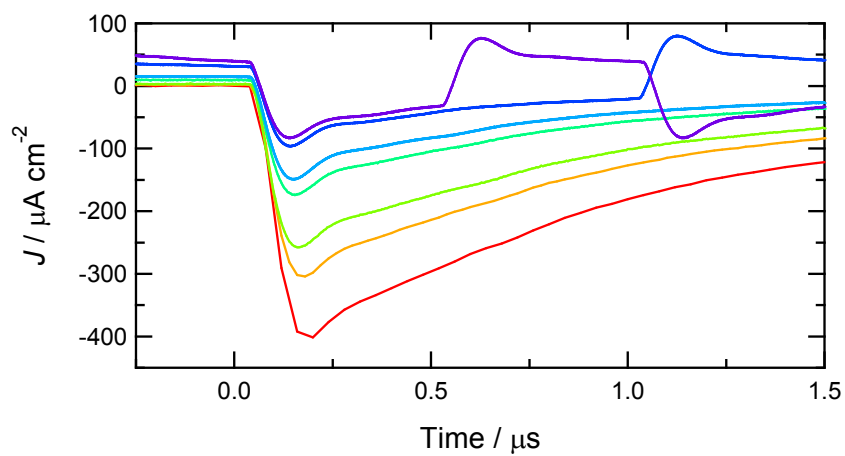


Fig. S5. Frequency dependence of the photocurrent for the [ITO|PC|C<sub>60</sub>|ZnPc|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

(a)



(b)

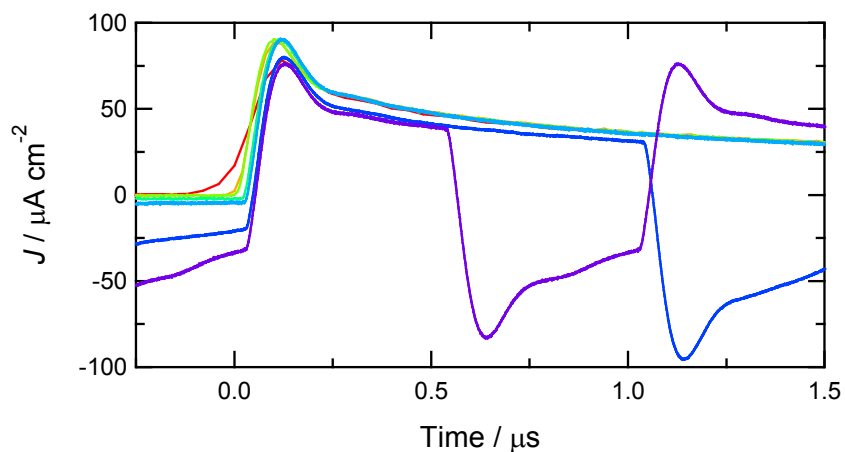
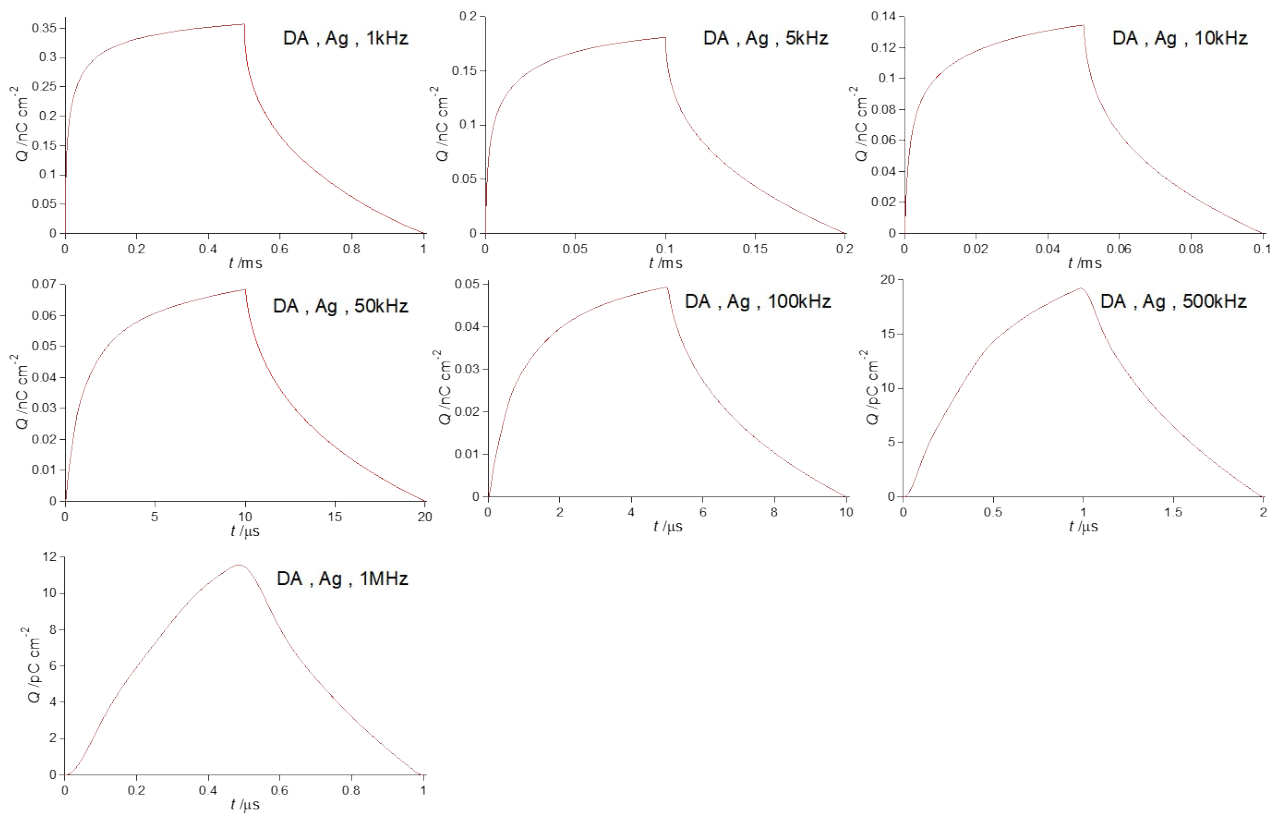
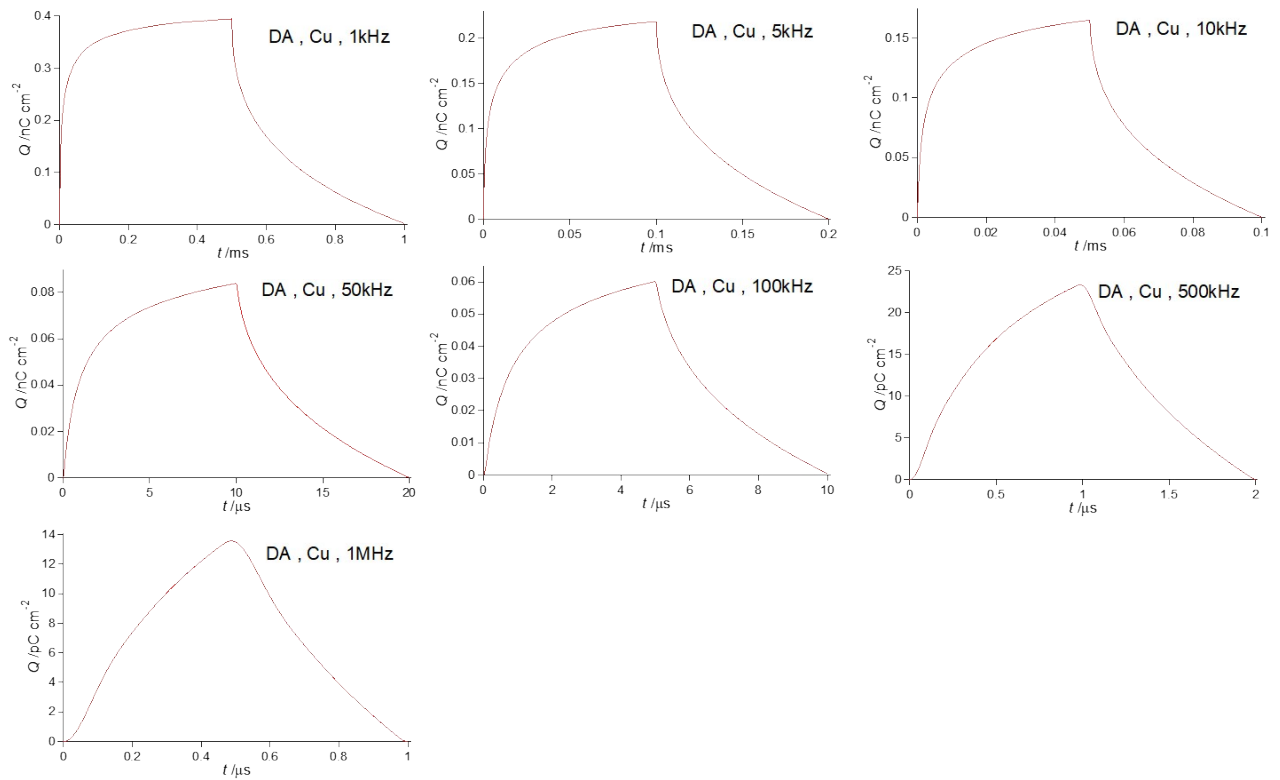


Fig. S6 Time trajectories of the photocurrent for the AD photocell at various frequencies under illumination (a) and in the dark (b).

(a) Ag



(b) Cu





(c) Au

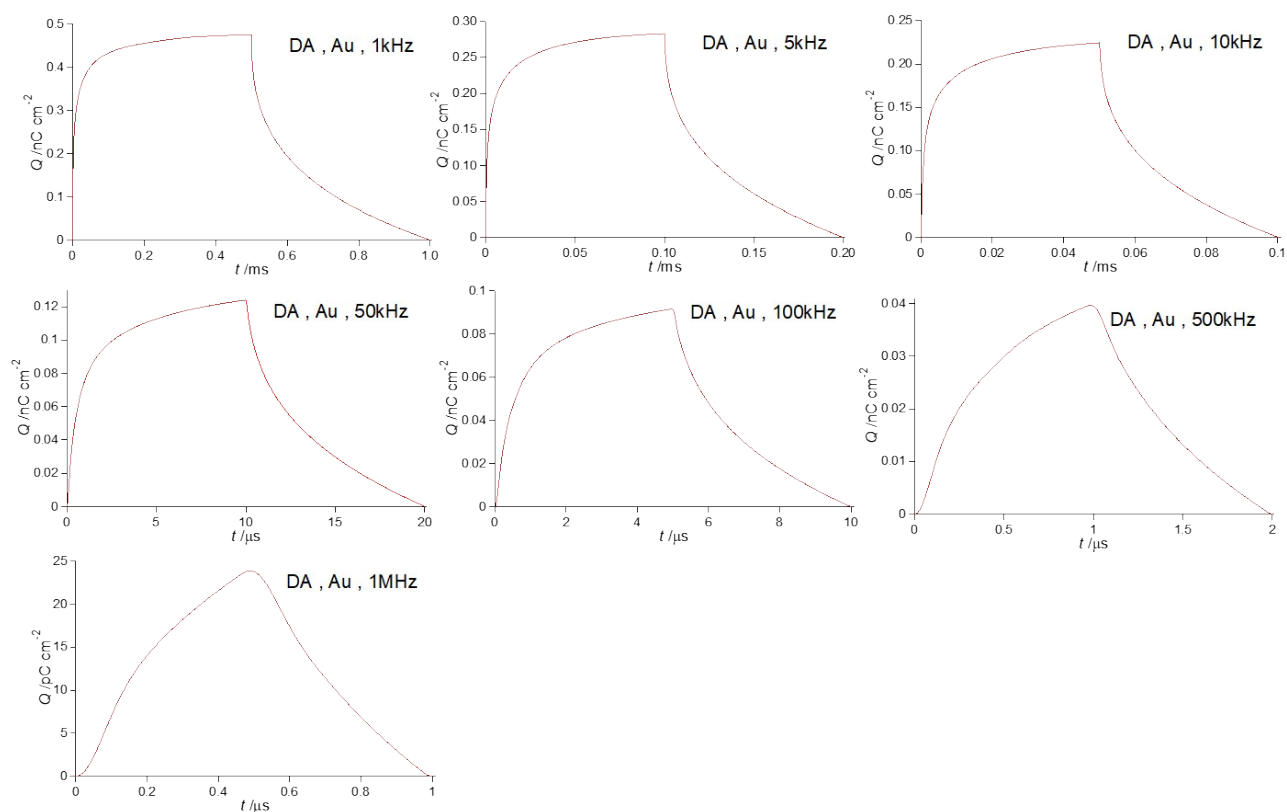
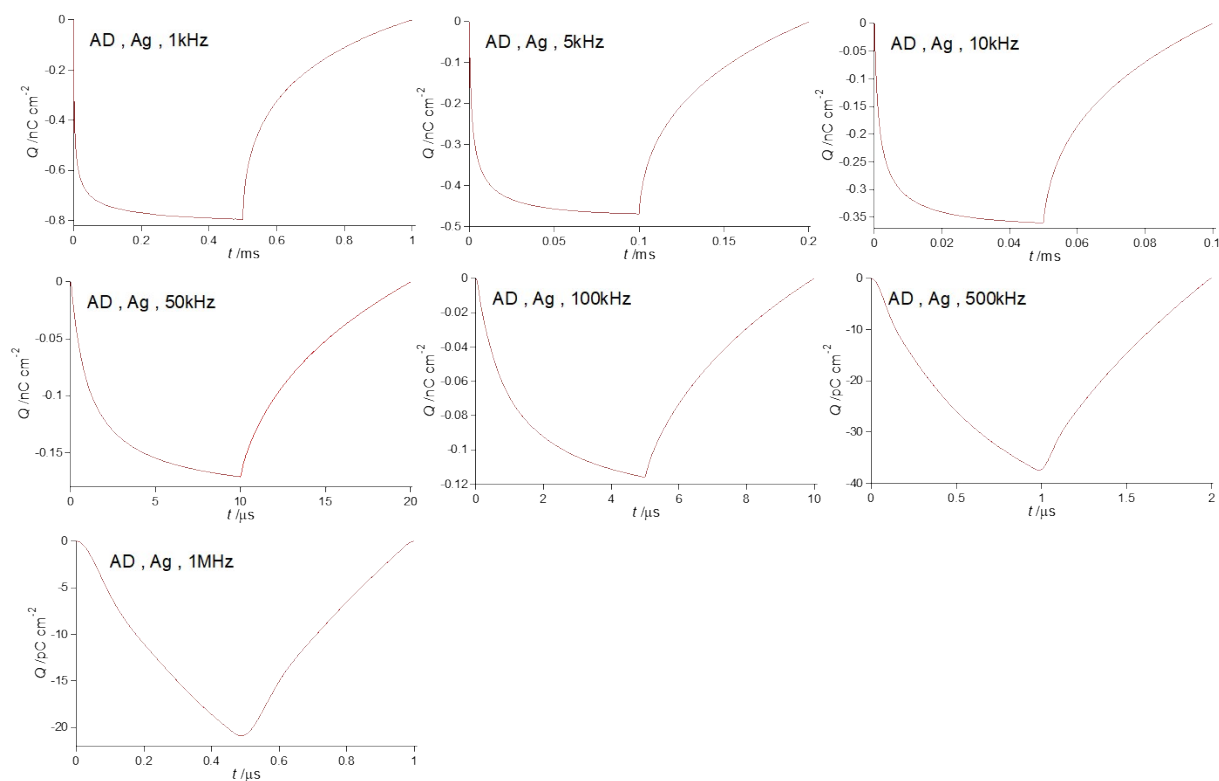
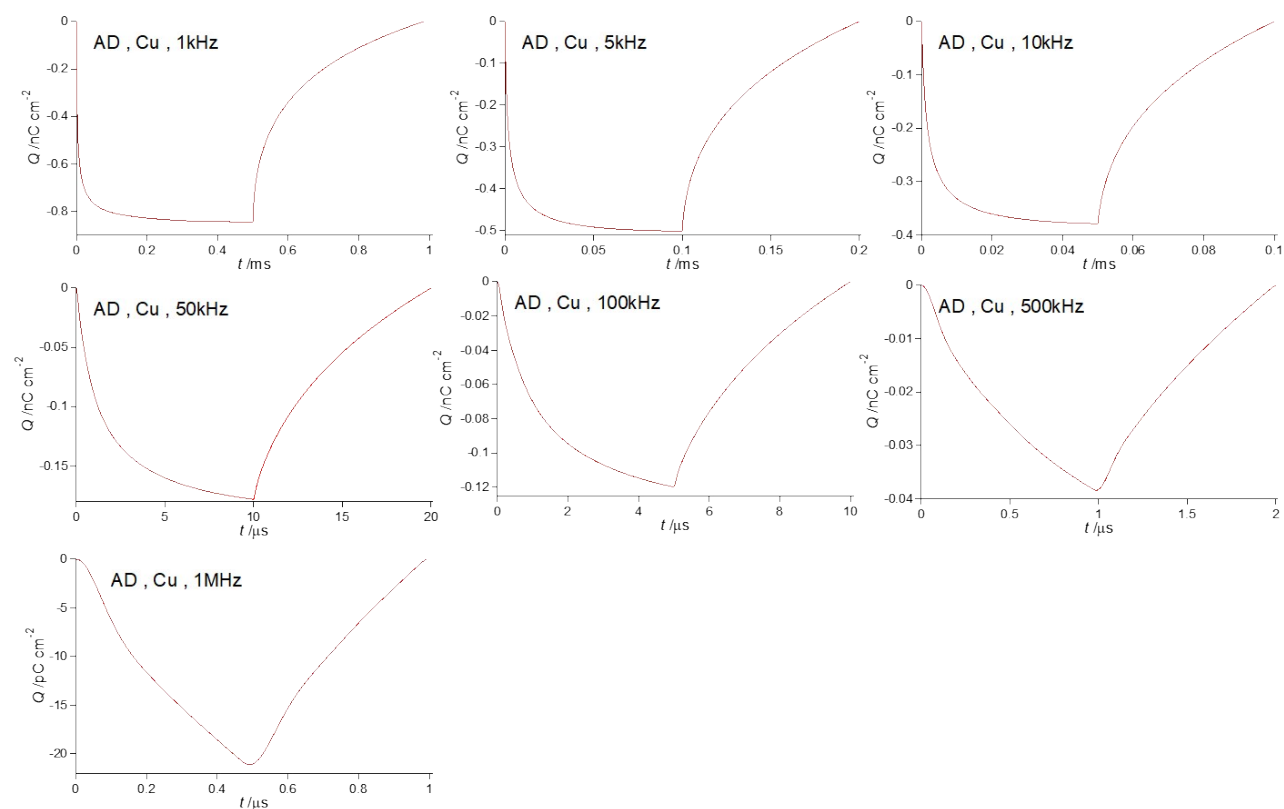


Fig. S7. Frequency dependence of the polarization for the [ITO|PC|ZnPc|C<sub>60</sub>|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

(a) Ag



(b) Cu



(c) Au

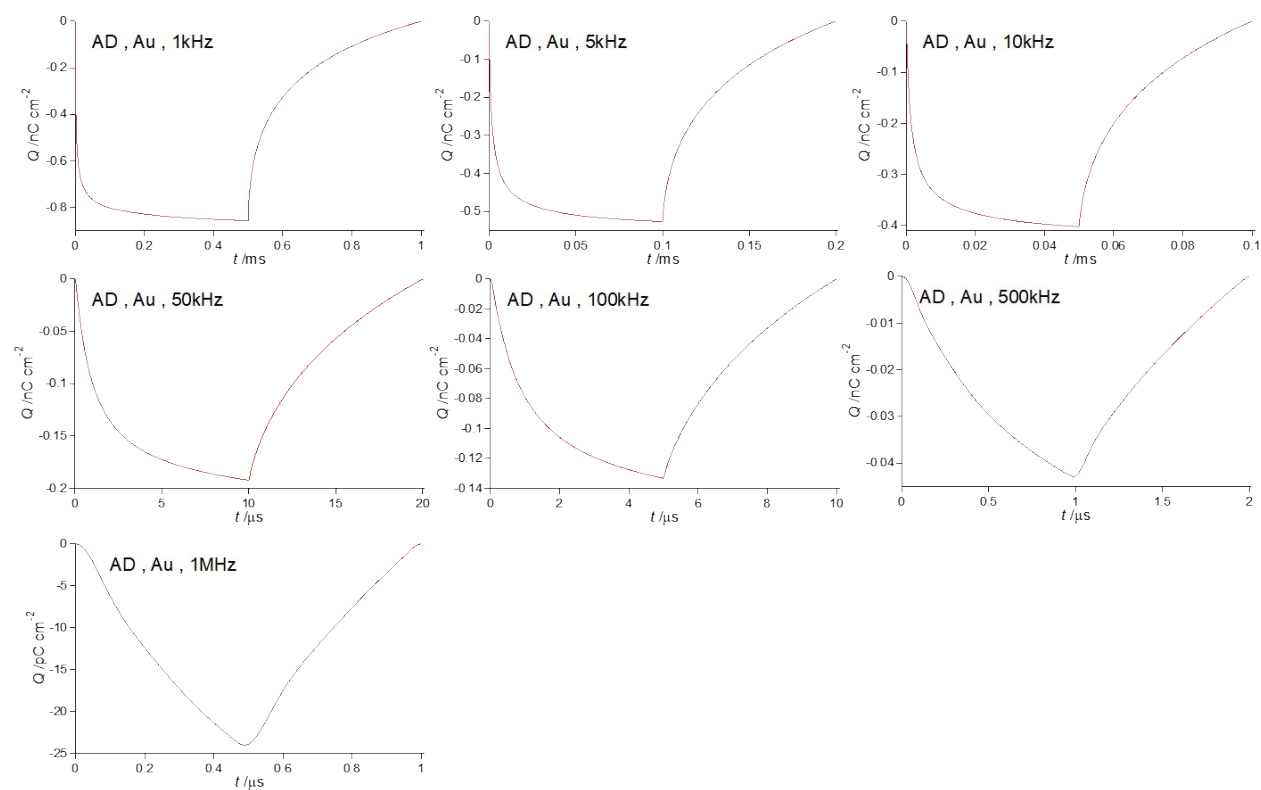


Fig. S8. Frequency dependence of the polarization for the [ITO|PC|C<sub>60</sub>|ZnPc|PC|M] ((a)M= Ag, (b) Cu and (c) Au) photocells from 1 kHz to 1 MHz.

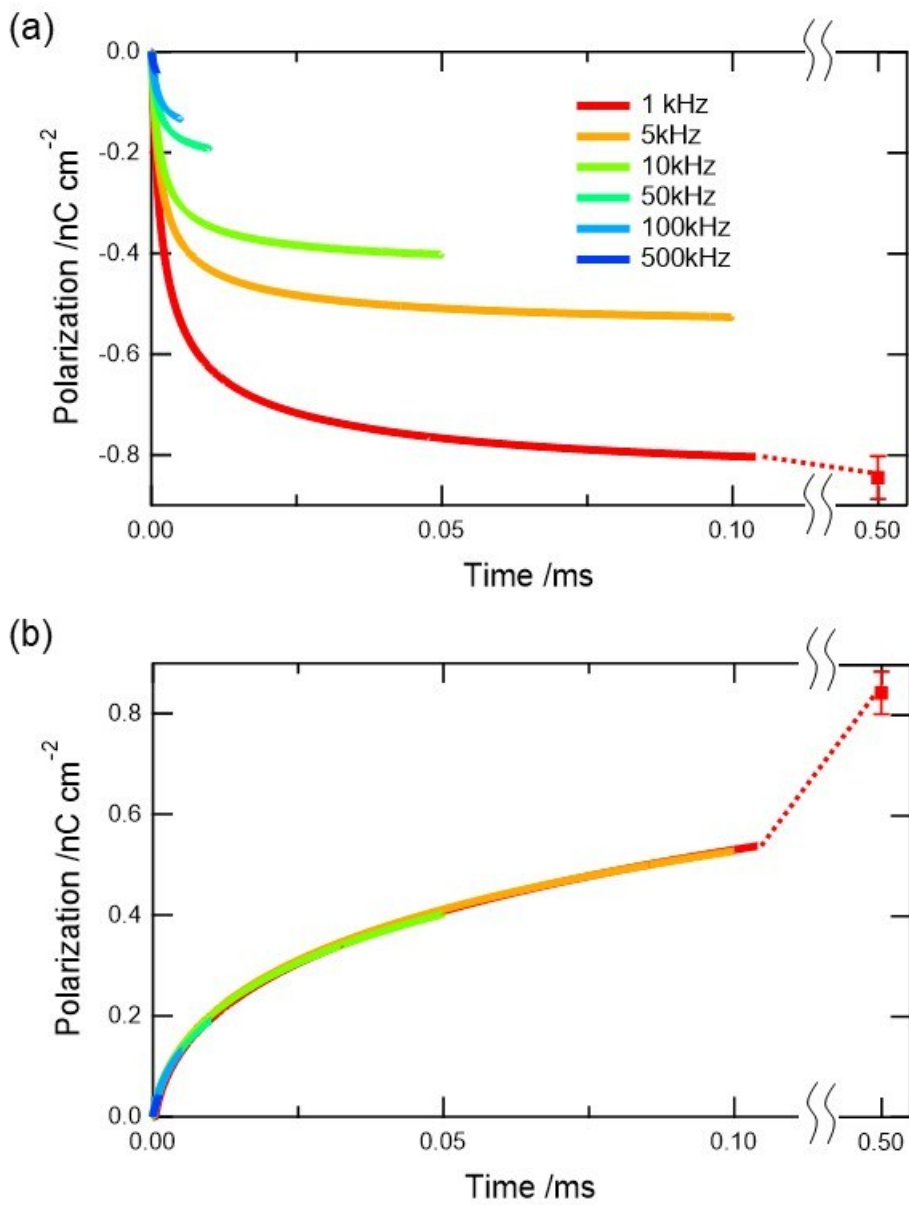


Fig. S9. Time dependence of the polarization change  $\Delta P$  for the AD photocell at various frequencies under illumination (a) and in the dark (b).

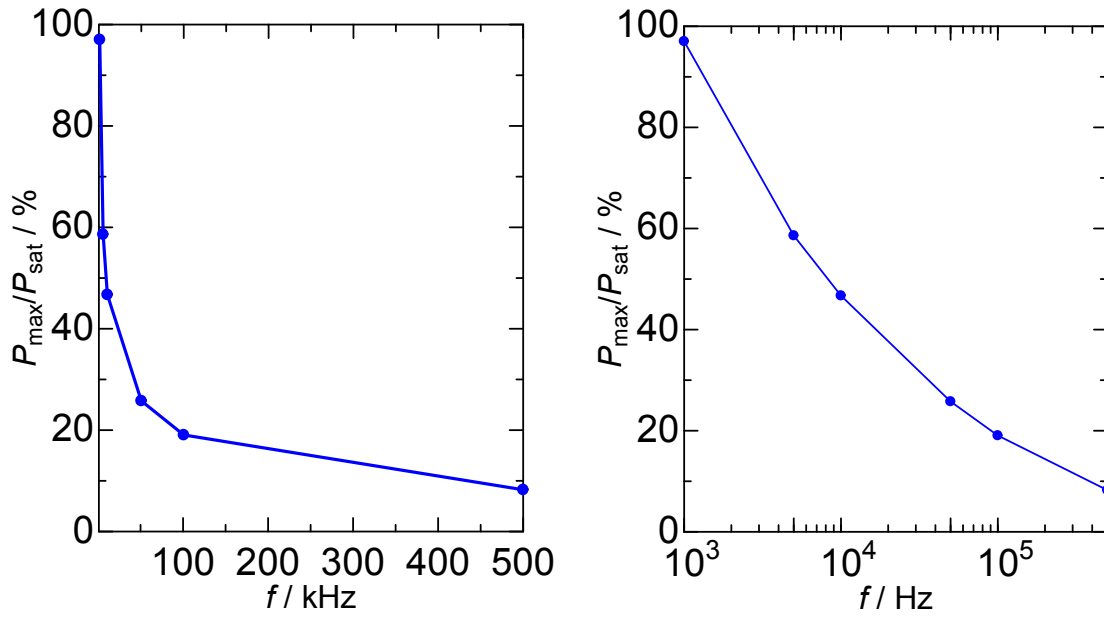


Fig. S10. Frequency dependence of  $\Delta P_{\max}/\Delta P_{\text{sat}}$  in a linear- (a) and a log-scale (b).