Electronic Supplementary Material (ESI) for RSC Advances.

ESI to accompany:

Cyanoacrylic- and (1-cyanovinyl)phosphonic acid anchoring ligands for application in copper-based dye-sensitized solar cells

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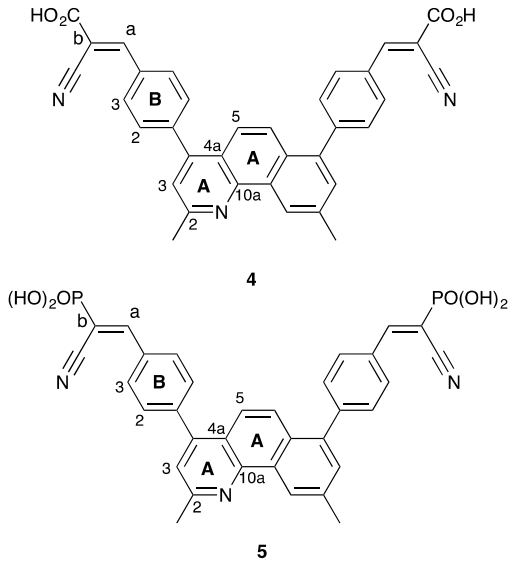
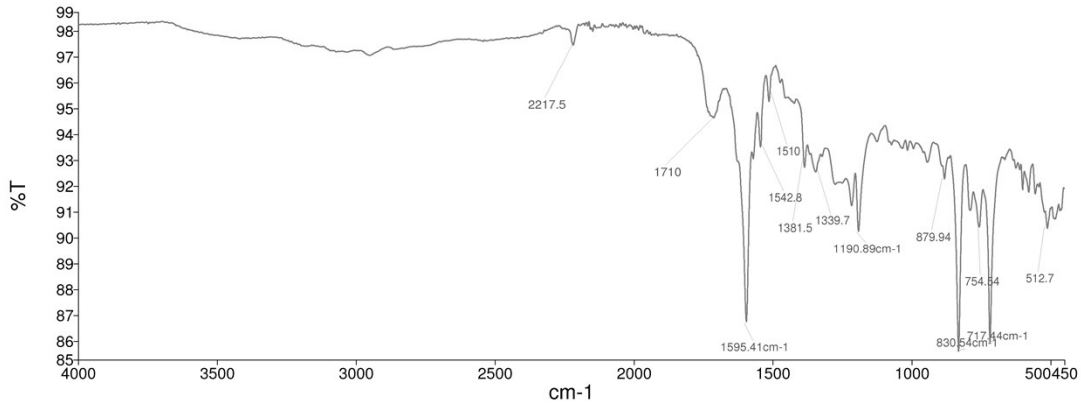
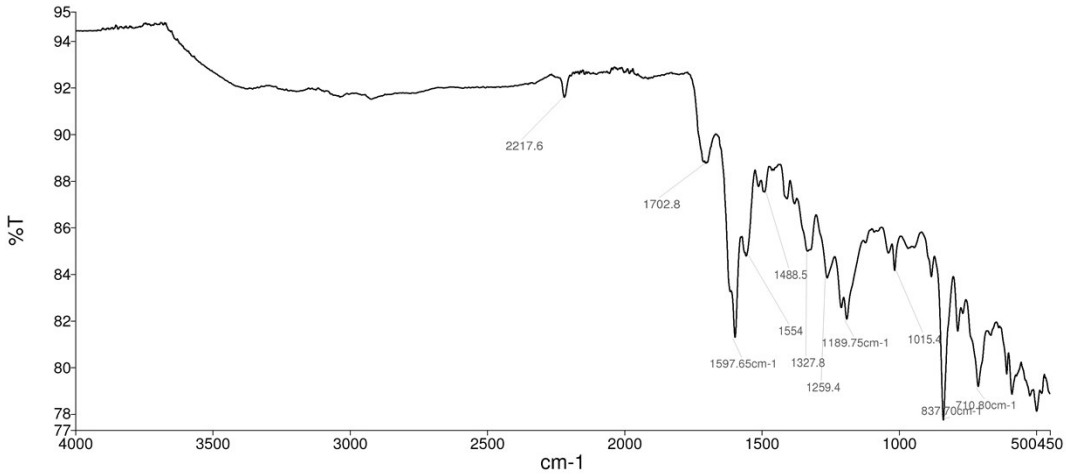


Scheme S1. Atom numbering for NMR spectroscopic assignments for ligands **4** and **5**.

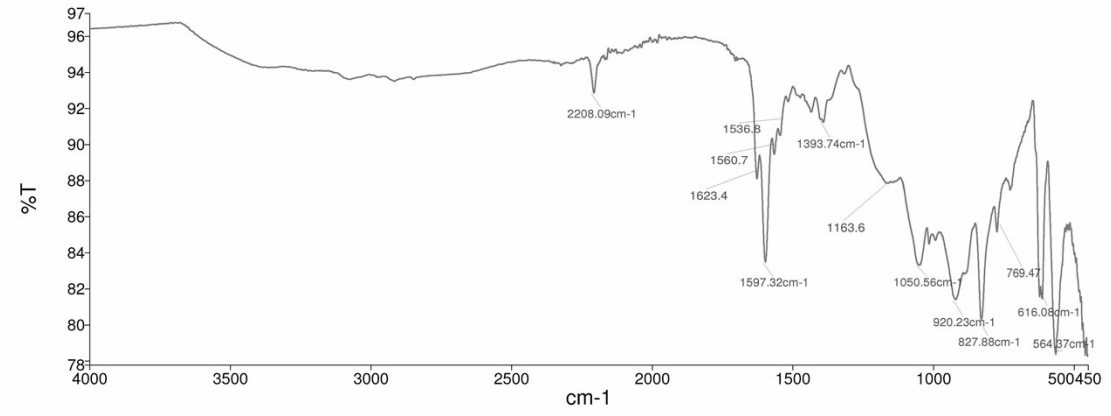


(a)

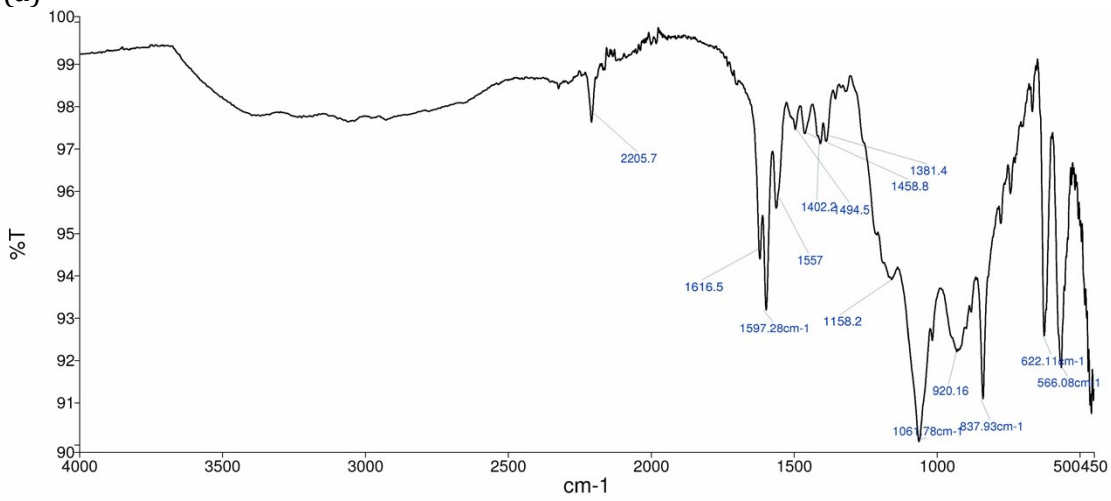


(b)

Fig. S1. Solid state IR spectra of (a) **2** and (b) **4**.



(a)



(b)

Fig. S2. Solid state IR spectra of (a) **3** and (b) **5**.

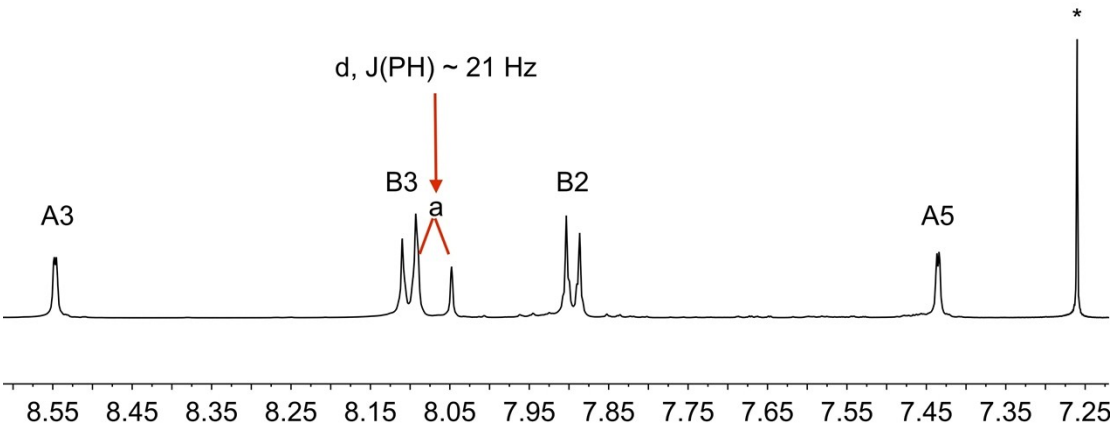


Fig. S3. The non-alkyl region of the 500 MHz ^{1}H NMR spectrum of a $CDCl_3$ solution of **3a**. * = residual CDH_2Cl.

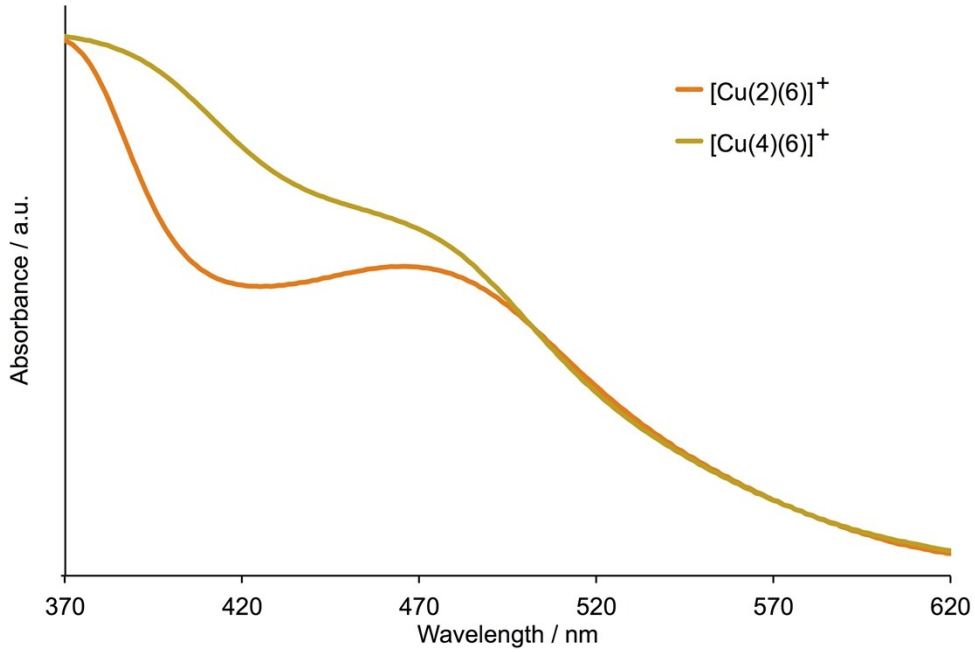


Fig. S4. Solid-state absorption spectra of transparent FTO/TiO_2 electrodes functionalized with [Cu(**2**)(**6**)]$^+$ and [Cu(**4**)(**6**)]$^+$. Both **2** and **4** contains a CO_2H anchor; **2** contains a bpy-metal binding unit and **4**, a phen-unit.

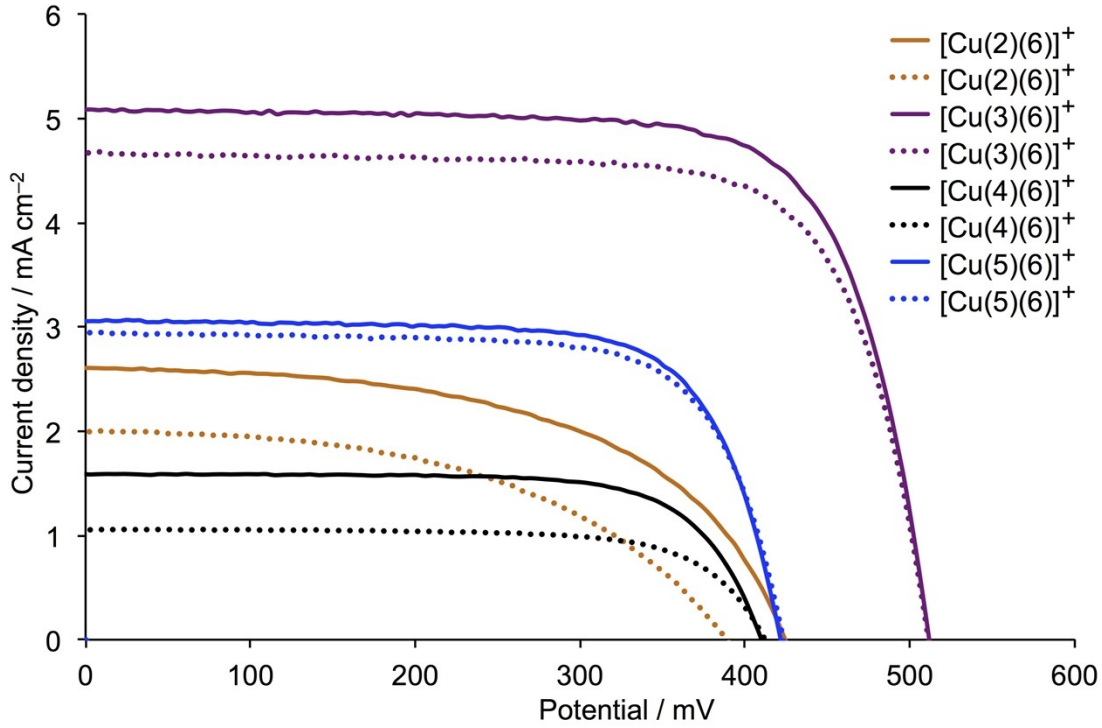


Fig. S5. *J–V* curves for duplicate pairs of DSCs containing [Cu(**2**)(**6**)]$^+$, [Cu(**3**)(**6**)]$^+$, [Cu(**4**)(**6**)]$^+$ and [Cu(**5**)(**6**)]$^+$ combined with I_3^-/I^- electrolyte.

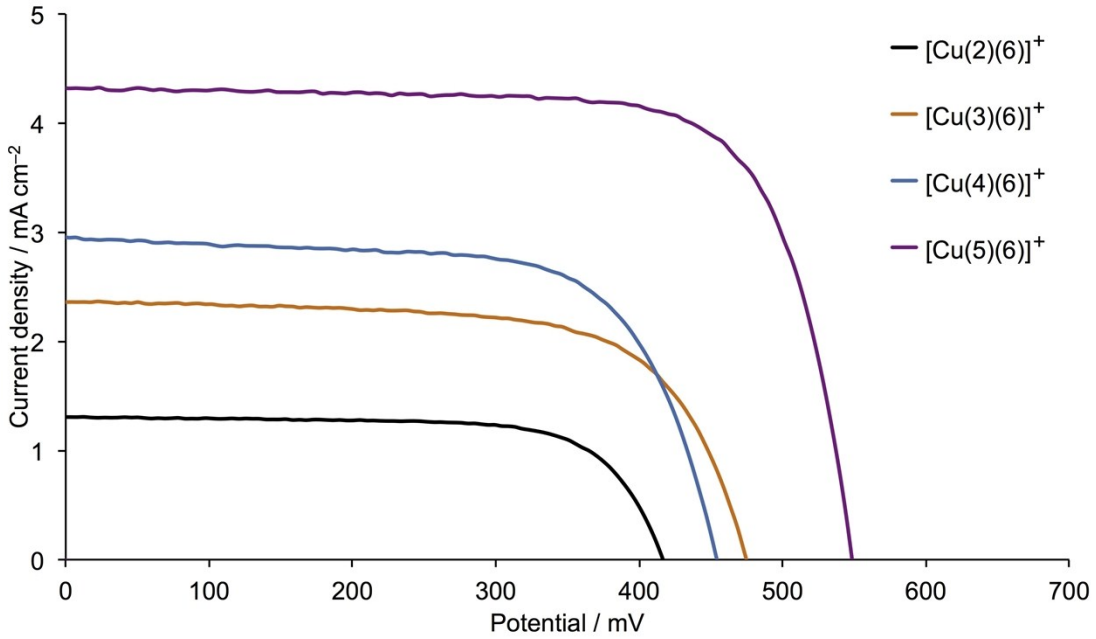


Fig. S6. *J*–*V* curves for duplicate pairs of DSCs 7 days after sealing cells containing [Cu(**2**)(**6**)]$^+$, [Cu(**3**)(**6**)]$^+$, [Cu(**4**)(**6**)]$^+$ and [Cu(**5**)(**6**)]$^+$ combined with I_3^-/I^- electrolyte.

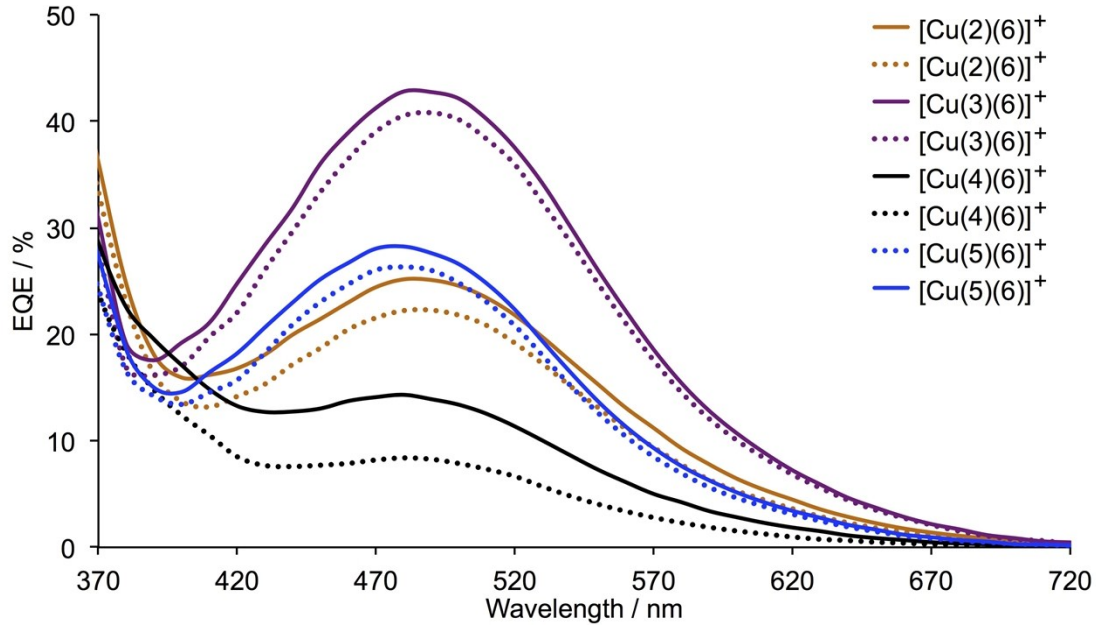


Fig. S7. EQE spectra for duplicate pairs of DSCs containing [Cu(**2**)(**6**)]$^+$, [Cu(**3**)(**6**)]$^+$, [Cu(**4**)(**6**)]$^+$ and [Cu(**5**)(**6**)]$^+$ combined with I_3^-/I^- electrolyte.

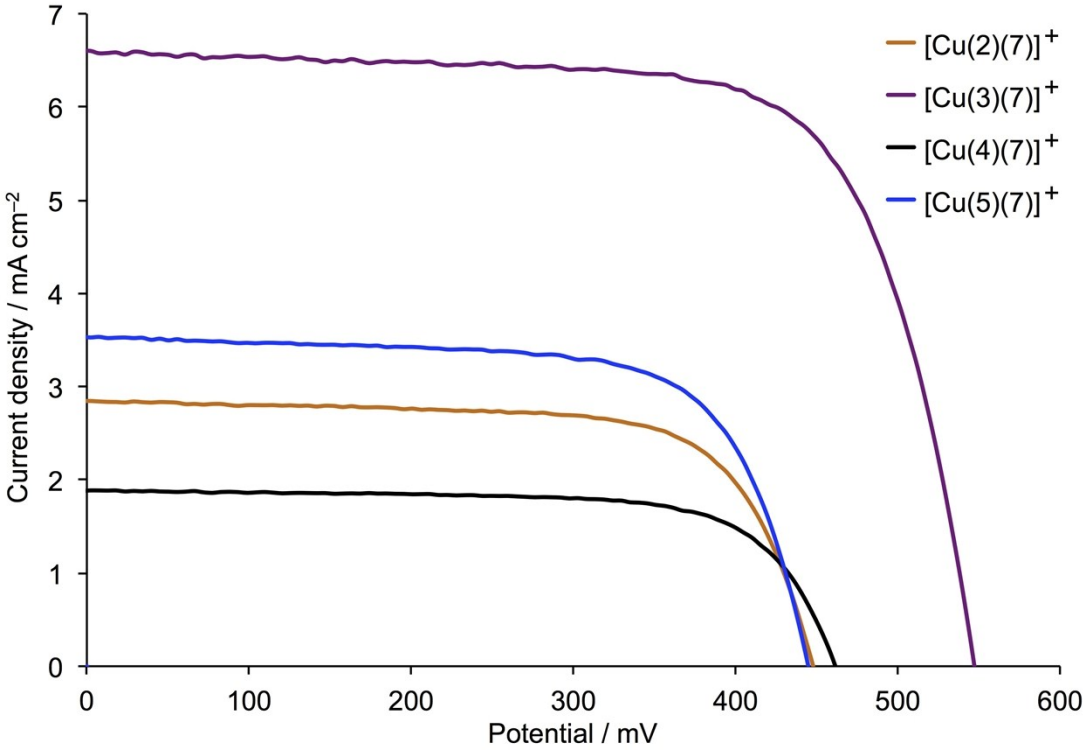


Fig. S8. *J*–*V* curves for DSCs containing [Cu(**2**)(**7**)]$^+$, [Cu(**3**)(**7**)]$^+$, [Cu(**4**)(**7**)]$^+$ and [Cu(**5**)(**7**)]$^+$ combined with I_3^-/I^- electrolyte.

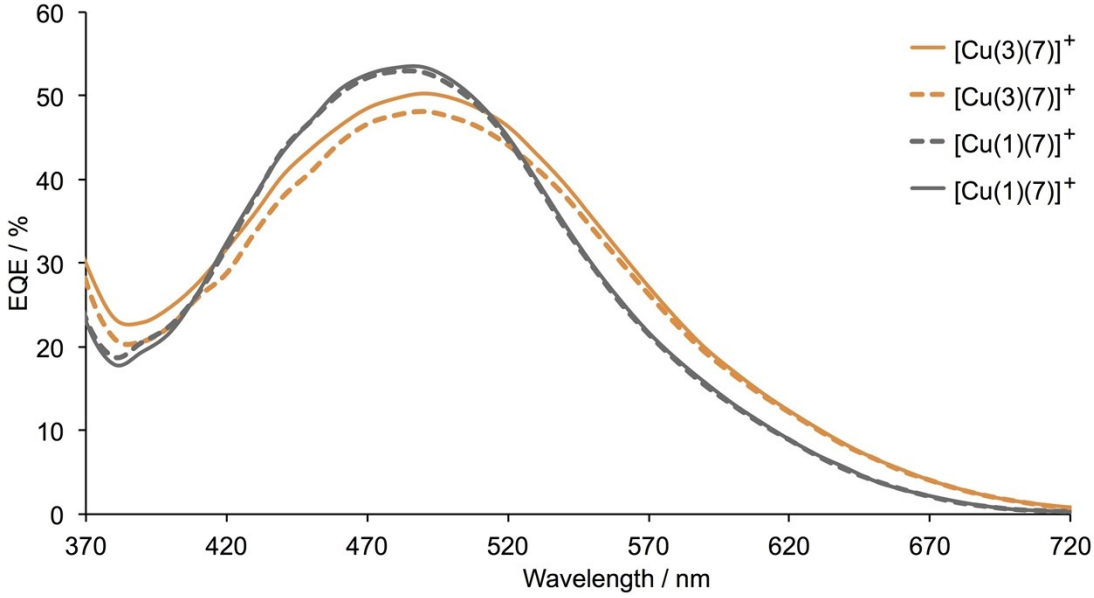


Fig. S9. EQE spectra for duplicate DSCs containing dyes [Cu(**3**)(**7**)]$^+$ and [Cu(**1**)(**7**)]$^+$.

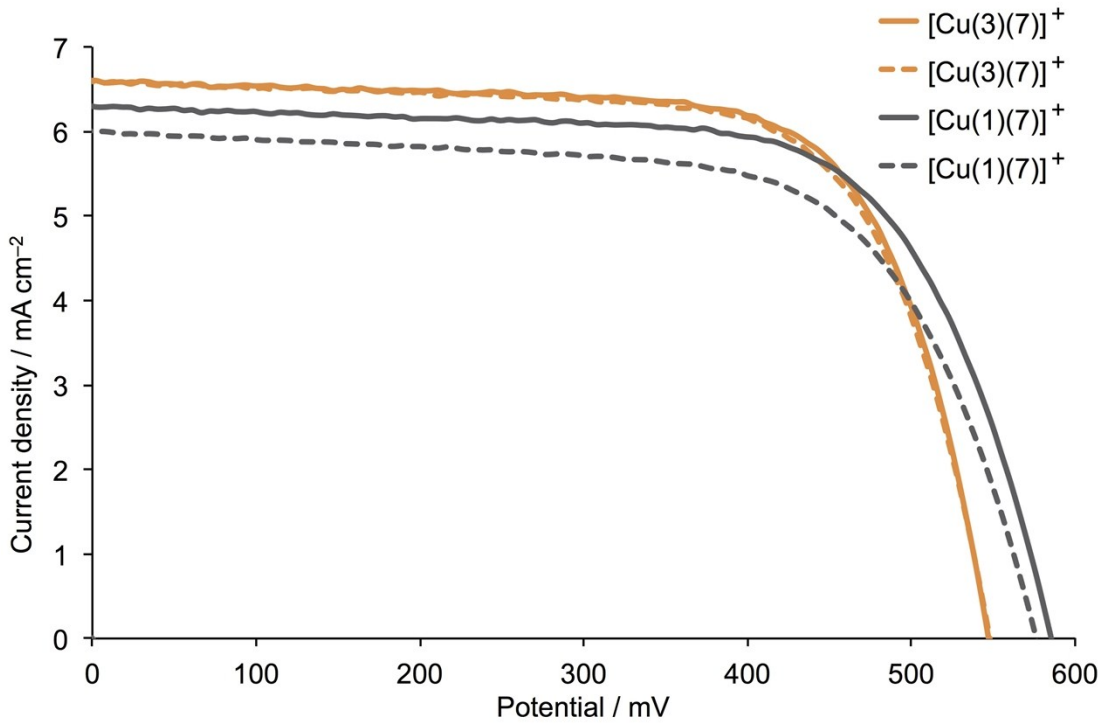


Fig. S10. *J*–*V* curves for duplicate, masked DSCs containing dyes [Cu(**3**)(**7**)]$^+$ and [Cu(**1**)(**7**)]$^+$ with I_3^-/I^- electrolyte.