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.
Fig. S1. Solid state IR spectra of (a) 2 and (b) 4.
**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$_2$Cl.
**Fig. S4.** Solid-state absorption spectra of transparent FTO/TiO₂ electrodes functionalized with [Cu(2)(6)]⁺ and [Cu(4)(6)]⁺. Both 2 and 4 contains a CO₂H 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 I₃⁻/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⁻/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⁻/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 $[\text{Cu}(3)(7)]^+$ and $[\text{Cu}(1)(7)]^+$ with $\text{I}_3^-/\text{I}^-$ electrolyte.