Supporting Information for

Increased Vis-to-UV upconversion performance by energy level matching between a TADF donor and high triplet energy acceptors

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Characterizations.

Absorption spectra were recorded on a JASCO V-670 spectrophotometer. Fluorescence spectra were measured by using a PerkinElmer LS 55 fluorescence spectrometer. Time-resolved photoluminescence lifetime measurements were carried out by using a time-correlated single photon counting lifetime spectroscopy system, HAMAMATSU Quantaurus-Tau C11367-02 (for fluorescence lifetime)/C11567-01(for delayed luminescence lifetime). Upconverted emission spectra were recorded on a Hamamatsu Photonics PMA-12 with the excitation source using an external, adjustable semiconductor laser (445 nm).

Determination of TTA-UC quantum yield.

The upconverted luminescence quantum efficiency in deaerated benzene was determined relative to a standard, Coumarin 6 in benzene (50 μM, Φ_{std} = 88.2%), according to the following equation

$$\Phi_{UC} = \Phi_{std}\left(\frac{A_{std}}{A_{UC}}\right)\left(\frac{I_{UC}}{I_{std}}\right) = 0.5\Phi_{UC}' \qquad \text{(S1)}$$

where Φ, A, and I represent the quantum yield, absorbance at 445 nm, and integrated photoluminescence spectral profile. The subscripts *UC* and *std* denote the parameters of the upconversion and standard systems. Note that the theoretical maximum of Φ_{UC}' is standardized to be 1 (100%).

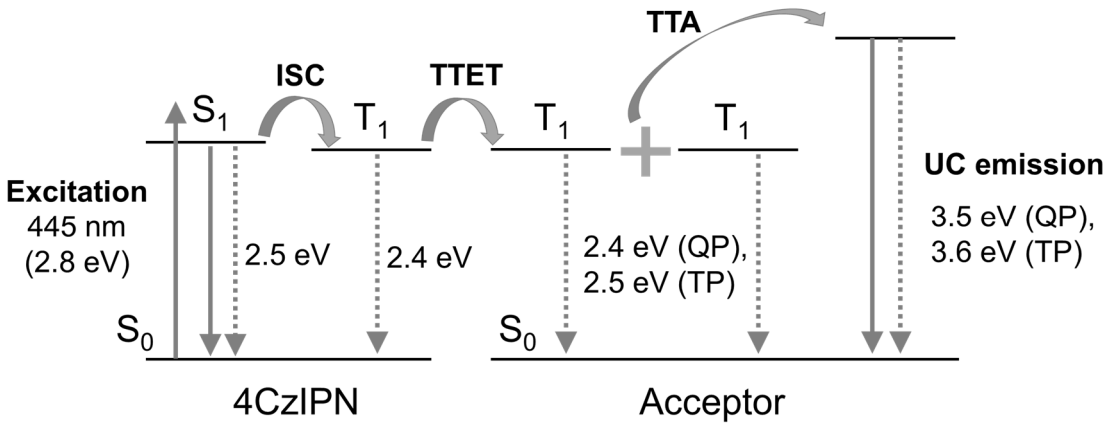

Figure S1. Energy diagram for TTA-UC using 4CzIPN as the triplet donor (sensitizer) and QP or TP as the triplet acceptor (emitter).

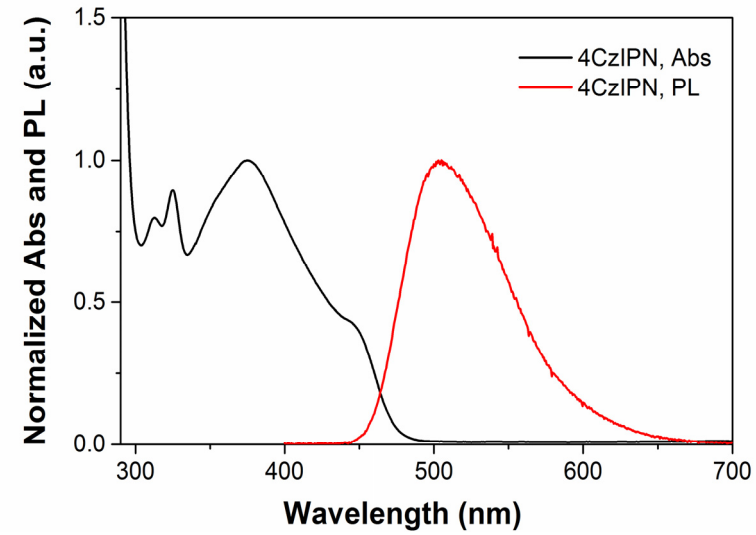

Figure S2. Absorption and photoluminescence (PL) spectra of 4CzIPN in benzene ([4CzIPN] = 50 μM).

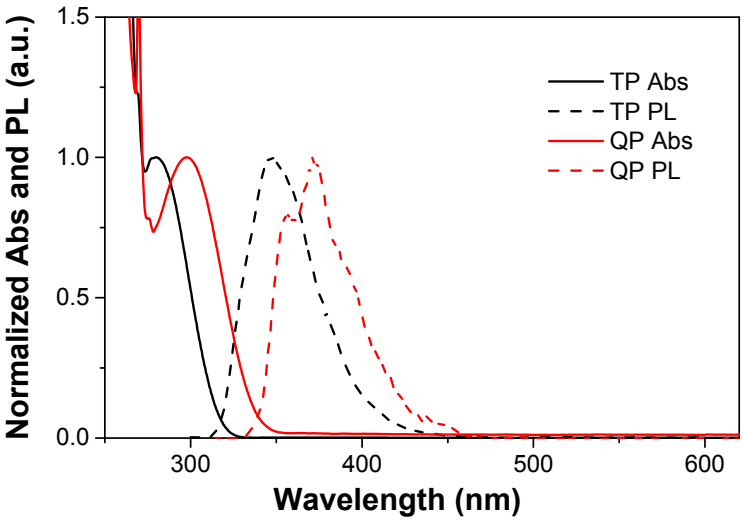

Figure S3. Normalized absorption and photoluminescence (PL) spectra of TP and QP in benzene ([TP] = [QP] = 50 μM).