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, Φstd = 88.2%), according to the following equation

$$\Phi_{UC} = \Phi_{std} \left( \frac{A_{UC}}{A_{std}} \right) \left( \frac{l_{UC}}{l_{std}} \right) = 0.5\Phi_{UC}^{'}$$

(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).