Supporting Information

An easily-synthesized AIE luminogen for lipid droplets-specific super-resolution imaging and two-photon imaging

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**Scheme S1.** Synthetic routes to DTPA-BT-H and DTPA-BT-M.

**Figure S1.** UV-Vis absorption spectra and molar absorption coefficient of DTPA-BT-H and DTPA-BT-M in dilute THF solution ([c]=1×10⁻⁵ mol/L).
Figure S2. PL spectra of DTPA-BT-H in a THF/water mixture with different water fraction ([c]=1×10^{-5} mol/L).

Figure S3. PL spectra of DTPA-BT-M in a THF/water mixture with different water fraction ([c]=1×10^{-5} mol/L).
Figure S4. Normalized PL spectra of DTPA-BT-H in solvents with varied polarities.

Figure S5. Normalized PL spectra of DTPA-BT-M in solvents with varied polarities.
Figure S6. Transient decay spectra of DTPA-BT-H and DTPA-BT-M in dilute THF solution ([c] = $1 \times 10^{-5}$ mol/L).

Figure S7. The calculated geometries of DTPA-BT-H and DTPA-BT-M in excited states (including top view and side view).

Figure S8. The conformational change of DTPA-BT-H from ground state ($S_0$) to excited state ($S_1$).
**Figure S9.** The conformational change of DTPA-BT-M from ground state ($S_0$) to excited state ($S_1$).

<table>
<thead>
<tr>
<th>Degree (°)</th>
<th>DTPA-BT-M</th>
</tr>
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<tbody>
<tr>
<td>1-N</td>
<td>47</td>
</tr>
<tr>
<td>2-N</td>
<td>48</td>
</tr>
<tr>
<td>3-N</td>
<td>32</td>
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<td>5-N</td>
<td>32</td>
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<tr>
<td>6-N</td>
<td>45</td>
</tr>
<tr>
<td>7-N</td>
<td>48</td>
</tr>
</tbody>
</table>

**Figure S10.** The single crystal structure of DTPA-BT-H and DTPA-BT-M in side view.

**Figure S11.** Power-dependent fluorescent images for DTPA-BT-H on AAO mask under the irradiation of STED beam (Scale bar = 2 μm).
**Figure S12.** Power-dependent fluorescent images for DTPA-BT-M on AAO mask under the irradiation of STED beam (Scale bar = 2 μm).

**Figure S13.** Plots of relative fluorescence intensity ($I/I_0$) for DTPA-BT-H and DTPA-BT-M on AAO mask under different STED power.
**Figure S14.** The fitting curve for depletion efficiency of DTPA-BT-H and DTPA-BT-M under various powers in STED nanoscopy.

**Figure S15.** The calculated resolution for DTPA-BT-M under various STED power.
**Figure S16.** The viability of LO₂ cells after incubated with DTPA-BT-M for 24 h and 48 h under different concentration.

**Figure S17.** The viability of HeLa cells after incubated with DTPA-BT-M for 24 h and 48 h under different concentration.
Figure S18. The PL spectra of DTPA-BT-M in DMSO and PBS solution for cell cultures.

Figure S19. The PL spectra of DTPA-BT-M in HeLa cells.

Figure S20. Confocal images of HeLa cells stained with BODIPY 493/503 (A), DTPA-BT-M (B) and their corresponding co-location profile by A and B (C).
Figure S21. Time-dependent fluorescent images for BODIPY 493/503 stained HeLa cells under the irradiation of STED beam (Scale bar = 300 nm).

Figure S22. Time-dependent fluorescent images for DTPA-BT-M stained HeLa cells under the irradiation of STED beam (Scale bar = 300 nm).

Figure S23. Fluorescent intensity for DTPA-BT-M-stained cells over various generations.
**Figure S24.** Fluorescence images by CLSMs (A-D) and STED nanoscopy (E-H) in long-term cellular tracking by using BODIPY 493/503; Fluorescence intensity along the white line in captured images by CLSMs and STED nanoscopy, and their corresponding FWMH values (I-L).

**Figure S25.** Fluorescent intensity for BODIPY 493/503-stained cells over various generations.
Figure S26. Fluorescence images of DTPA-BT-M stained lung tissue in one-photon mode (A) and two-photon mode (B) at different penetration depth.

Figure S27. The fluorescent intensity curve for DTPA-BT-M at various penetration depths in one-photon imaging.
Figure S28. The fluorescent intensity curve for DTPA-BT-M at various penetration depths in two-photon imaging.
Table S1. The $\delta_{2PA}$ of typical AIEgens for two-photon fluorescence microscopy.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Ex</th>
<th>$\delta_{2PA}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBP-b-TPA [a]</td>
<td>1040 nm</td>
<td>207±7 GM</td>
</tr>
<tr>
<td>CDPP-4SO3 [b]</td>
<td>820 nm</td>
<td>162 GM</td>
</tr>
<tr>
<td>BTPETQ dots [c]</td>
<td>1200 nm</td>
<td>$7.63 \times 10^4$ GM</td>
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<tr>
<td>TP [d]</td>
<td>840 nm</td>
<td>265 MG</td>
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<tr>
<td>TQ-BPN [e]</td>
<td>1300 nm</td>
<td>$1.22 \times 10^3$ GM</td>
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<tr>
<td>DTPA-BT-M [f]</td>
<td>840 nm</td>
<td>1581 GM</td>
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NMR and MS spectra