Supplementary Information

Gold Nanoparticles Inlaid TiO₂ Photoanodes: A Superior Candidate for High-Efficiency Dye-Sensitized Solar Cells

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Figure S1. Synthetic route of the cross-linked polymer (CLP).
**Figure S2.** TEM image of the as-synthesized polymer stabilized Au nanoparticles dispersed in methanol.

**Figure S3.** UV-vis absorption spectrum of the as-synthesized polymer stabilized Au nanoparticles dispersed in methanol.

**Figure S4.** XPS spectrum of the Au-TiO$_2$ (Au/TiO$_2$ = 0.800wt%) composite film.
Figure S5. (a) The chemical structure of FNE29 and (b) the UV-vis absorption spectrum of FNE29 in THF.

Figure S6. Efficiency evolution of the best DSSC fabricated with 0.168 wt% Au-TiO₂ photoanode subjected to aging.
**Figure S7.** The multiples in enhancement of maximum absorbance of FNE29 caused by the plasma effect as a function of Au amount. Assuming that the absorbance of dye-loaded TiO₂ film is proportional to the dye amount without regard to the plasma effect, this suppositional absorbance \( A'(\text{Au-TiO}_2) \) for each dye-loaded Au-TiO₂ film is estimated from the absorbance of dye-loaded pure TiO₂ film \( A(\text{TiO}_2) \) times the dye amount in each film \( c(\text{Au-TiO}_2) \) divided by the dye amount in pure TiO₂ film \( c(\text{TiO}_2) \). Therefore, multiple enhancement = \( A(\text{Au-TiO}_2)/A'(\text{Au-TiO}_2) \), where \( A(\text{Au-TiO}_2) \) is the measured absorbance for the dye-loaded Au-TiO₂ film.

**Figure S8.** Electron lifetime as a function of charge density at open circuit.

**Figure S9.** Structures of dyes MK1 (ref. 1), MK3 (ref.1) and FNE31 (ref.2).
Table S1. Photovoltaic performance parameters for DSSCs based on various dyes and 4 μm films\(^a\).

<table>
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<tr>
<th>Dye</th>
<th>Photoanode</th>
<th>(V_{oc}) (mV)</th>
<th>(J_{sc}) (mA cm(^{-2}))</th>
<th>FF</th>
<th>(\eta) (%)</th>
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<tbody>
<tr>
<td>MK1</td>
<td>TiO(_2)</td>
<td>782</td>
<td>7.53</td>
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<td>Au-TiO(_2)</td>
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<td>8.73</td>
<td>0.76</td>
<td>5.14</td>
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</table>

\(^a\)The Au/TiO\(_2\) weight ratio in the Au-TiO\(_2\) film is 0.104wt%.

References