Supporting Information

One-pot Synthesis of Hierarchical Mesoporous SnO$_2$ Spheres Using Graft Copolymer: Enhanced Photovoltaic and Photocatalytic Performance

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**Fig. S1.** (a) Plan-view SEM images of the multi-functional om-SnO$_2$ IF layer and (b) cross-sectional SEM image of the multi-functional om-SnO$_2$ IF layer coated on FTO glass.
Fig. S2. Reflectance spectra of a nanocrystalline SnO$_2$ (NC-SnO$_2$) on multi-functional om-SnO$_2$ IF layer-coated FTO glass without N719 dye sensitizer.$^a$

![Graph showing reflectance spectra of NC-SnO$_2$.]

$^a$ commercially available nanocrystalline SnO$_2$ (NC-SnO$_2$) was purchased from Alpha-Aesar.
Fig. S3. Photocurrent density-voltage curves of DSSCs based on NP-SnO$_2$ spheres and HM-SnO$_2$ spheres on a multi-functional om-SnO$_2$ IF layer photoanode with liquid state electrolyte under AM 1.5G one sun light intensity.
Fig. S4. Normalized efficiencies of ssDSSCs with HM-SnO$_2$ spheres on a multi-functional om-SnO$_2$ IF layer photoanode as a function of time.
Fig. S5. Photocatalytic reactions of Degussa P25 with methyl orange under UV irradiation.
Fig. S6. Pseudo-first-order kinetic rate plots of methyl orange with NP-SnO$_2$ spheres and HM-SnO$_2$ spheres.

In pseudo-first-order kinetics of $\ln(Co/C) = kt$, where $Co/C$ is the normalized methyl orange concentration, $t$ is the reaction time, and $k$ is the rate constant.$^1$
Table S1. Dye adsorption values for NP-SnO\textsubscript{2} spheres/om-SnO\textsubscript{2} IF layer and HM-SnO\textsubscript{2} spheres/om-SnO\textsubscript{2} IF layer photoanode.

<table>
<thead>
<tr>
<th>Photoanode</th>
<th>Absorption at 515nm</th>
<th>Dye adsorbed (nmol/cm\textsuperscript{2})</th>
<th>Dye adsorbed (mg/cm\textsuperscript{2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>NP-SnO\textsubscript{2} spheres/om-SnO\textsubscript{2} IF layer</td>
<td>0.035</td>
<td>63.1</td>
<td>0.075</td>
</tr>
<tr>
<td>HM-SnO\textsubscript{2} spheres/om-SnO\textsubscript{2} IF layer</td>
<td>0.062</td>
<td>109.3</td>
<td>0.129</td>
</tr>
</tbody>
</table>

The N719 dye-sensitized SnO\textsubscript{2} photoanodes were dipped into 10mL of 0.01Maqueous ethanolic (1:1) alkaline solution of NaOH. The mixtures were stirred until complete desorption of the N719 dye. The volume of the alkali solution containing the fully desorbed dye was carefully measured by UV–visible spectroscopy at 515 nm. The adsorbed dye was calculated according to the Beer-Lambert law.\textsuperscript{2}

Reference
