# Electronic Supplementary Information

**One-step femtosecond laser patterning of light-trapping structure on dye-sensitized solar cell photoelectrode**

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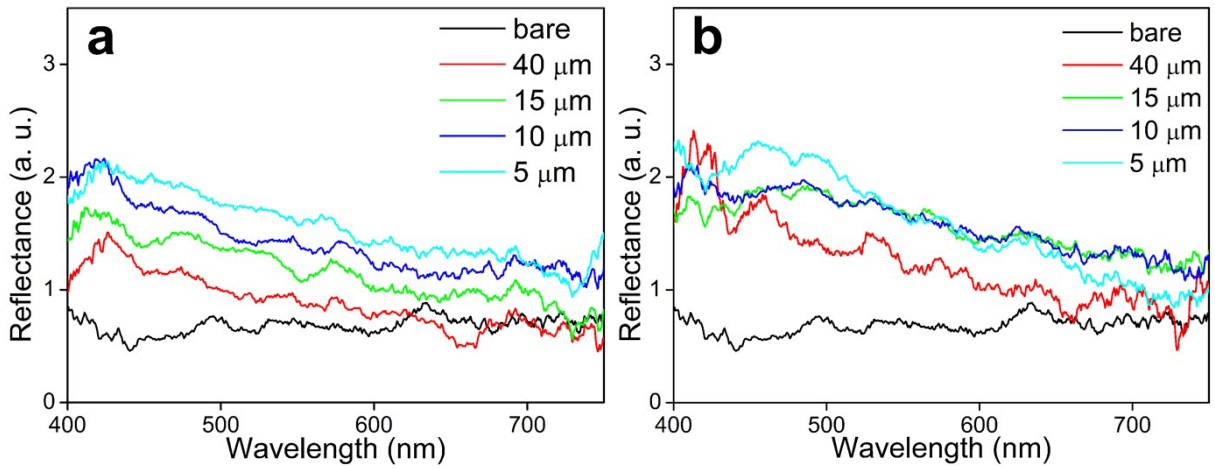


**Figure S1** Reflectance spectra of nanostructured $TiO_2$ films before and after laser ablation. (a) Results of bare and grating-patterned $TiO_2$; (b) results of bare and orthogonal-grid-patterned $TiO_2$. The grid spacing of both types of patterns on the ablated photoelectrodes ranges from 5 μm to 40 μm.

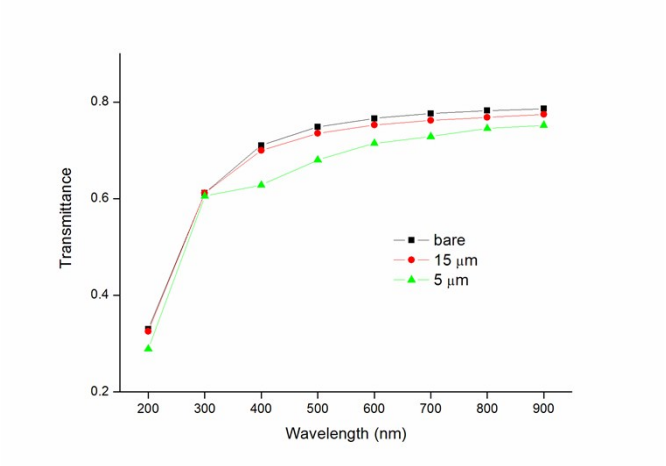


**Figure S2** Simulated transmittance spectra of nanostructured $TiO_2$ films before and after laser ablation with orthogonal-grid patterns. The results of 5-μm and 15-μm grid spacings are shown.

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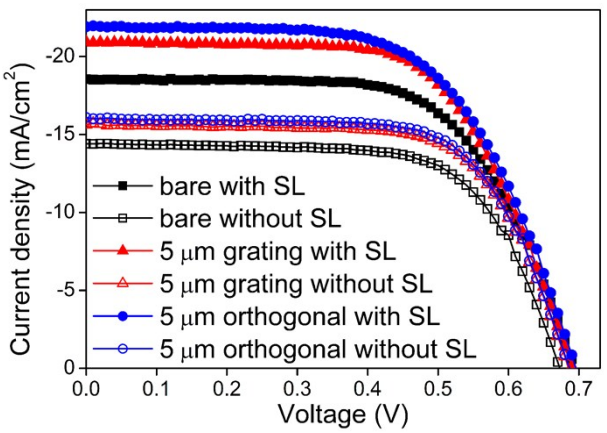


**Figure S3** *J-V* curves of DSSCs with and without scattering layer (SL). The results of DSSCs with

10 bare, 5-μm grating-patterned and 5-μm orthogonal-grid-patterned $TiO_2$ photoelectrodes are shown. The thickness of the photoelectrode without SL is 10 μm.

**Table S1** Amount of adsorbed dye on each $TiO_2$ photoelectrode (all with SL).

| Pattern | amount of adsorbed dye ($10^{-7}$ mol/cm$^2$) | $J_{sc}$ (mA/cm$^2$) | $\eta$ (%) |
|---|---|---|---|
| bare | 1.53 | 18.6 | 8.21 |
| 40 μm grating | 1.30 | 20.2 | 8.61 |
| 15 μm grating | 1.36 | 20.6 | 8.73 |
| 10 μm grating | 1.34 | 20.5 | 8.88 |
| 5 μm grating | 1.29 | 20.9 | 9.14 |
| 40 μm orthogonal | 1.30 | 20.9 | 9.16 |
| 15 μm orthogonal | 1.32 | 21.9 | 9.18 |
| 10 μm orthogonal | 1.40 | 21.6 | 9.23 |
| 5 μm orthogonal | 1.35 | 21.9 | 9.32 |

**Table S2** *J-V* parameters of DSSCs with and without SL corresponding to the curves in Fig. S3.

| $TiO_2$ Photoelectrode | $V_{oc}$ (V) | $J_{sc}$ (mA/cm$^2$) | FF (%) | $\eta$ (%) |
|---|---|---|---|---|
| bare with SL | 0.70 | 18.6 | 63.2 | 8.21 |
| bare without SL | 0.68 | 14.4 | 66.5 | 6.51 |
| 5 μm grating with SL | 0.70 | 20.9 | 62.4 | 9.14 |
| 5 μm grating without SL | 0.69 | 15.6 | 67.5 | 7.29 |
| 5 μm orthogonal with SL | 0.70 | 21.9 | 60.7 | 9.32 |
| 5 μm orthogonal without SL | 0.69 | 16.1 | 67.1 | 7.45 |