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Supplementary Information

Nanoflower-Like P-Doped Nickel Oxide as a Catalytic Counter Electrode for Dye-Sensitized Solar Cells

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Table S1. Photovoltaic parameters of the DSSCs with P-NiO-0.5, NiO, and Pt CEs, measured at 100 mW cm^{-2} (AM1.5G) in rear illumination. The standard deviation for each data is based on three cells.

CEs	η (%)	V_{oc} (V)	J_{sc} (mA cm^{-2})	*FF*
P-NiO-0.5	5.45 ± 0.03	0.76 ± 0.03	10.15 ± 0.07	0.71 ± 0.00
NiO	0.16 ± 0.00	0.73 ± 0.06	3.18 ± 0.02	0.07 ± 0.00
Pt	4.99 ± 0.02	0.76 ± 0.02	9.25 ± 0.01	0.71 ± 0.00

Table S2. Photovoltaic parameters of the DSSC with P-NiO-0.5 CE, obtained at different light conditions. The standard deviation for each data is based on three cells.

Light Intensity (mW cm^{-2})	η (%)	V_{oc} (V)	J_{sc} (mA cm^{-2})	*FF*
100 (1 Sun)	9.05 ± 0.04	0.79 ± 0.00	16.96 ± 0.01	0.68 ± 0.00
80 (0.8 Sun)	8.97 ± 0.01	0.78 ± 0.01	13.13 ± 0.01	0.70 ± 0.00
60 (0.6 Sun)	8.75 ± 0.02	0.76 ± 0.00	9.40 ± 0.01	0.73 ± 0.01
40 (0.4 Sun)	8.21 ± 0.01	0.75 ± 0.00	5.87 ± 0.08	0.75 ± 0.00
20 (0.2 Sun)	7.87 ± 0.00	0.73 ± 0.02	2.86 ± 0.01	0.75 ± 0.00

Table S3. Photovoltaic parameters of the DSSCs with Pt CE obtained at different light conditions. The standard deviation for each data is based on three cells.

Light intensity (mW cm^{-2})	η (%)	V_{oc} (V)	J_{sc} (mA cm^{-2})	*FF*
100 (1 Sun)	8.51 ± 0.00	0.79 ± 0.00	16.17 ± 0.01	0.67 ± 0.00
80 (0.8 Sun)	8.47 ± 0.01	0.77 ± 0.01	12.41 ± 0.01	0.70 ± 0.00
60 (0.6 Sun)	8.16 ± 0.00	0.76 ± 0.00	9.01 ± 0.03	0.71 ± 0.00
40 (0.4 Sun)	7.51 ± 0.01	0.75 ± 0.00	5.61 ± 0.04	0.72 ± 0.01
20 (0.2 Sun)	6.17 ± 0.05	0.71 ± 0.00	2.66 ± 0.03	0.65 ± 0.00

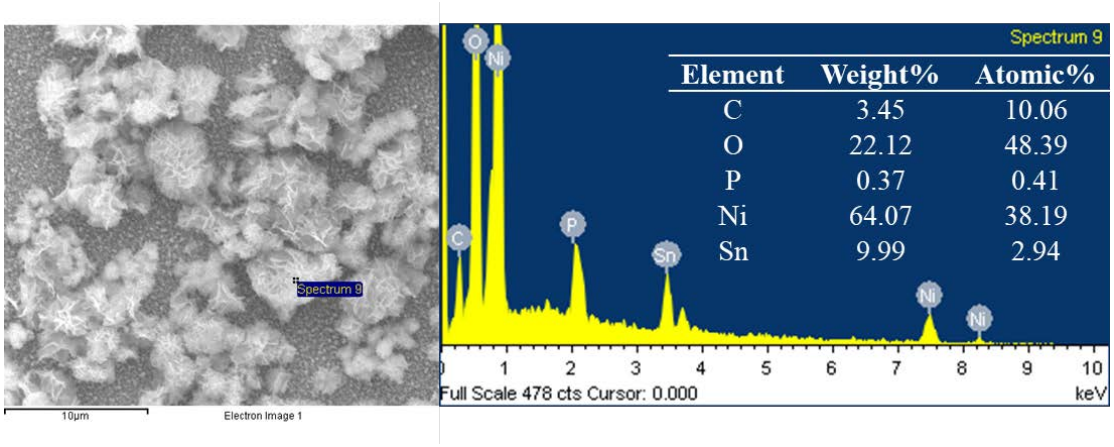

Figure S1. EDAX analysis of the P-NiO film.

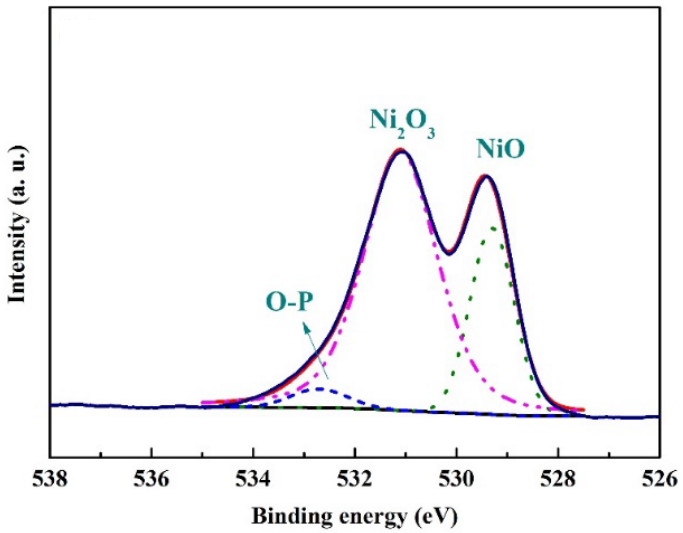

Figure S2. XPS spectra of the P-NiO in O 1s region.

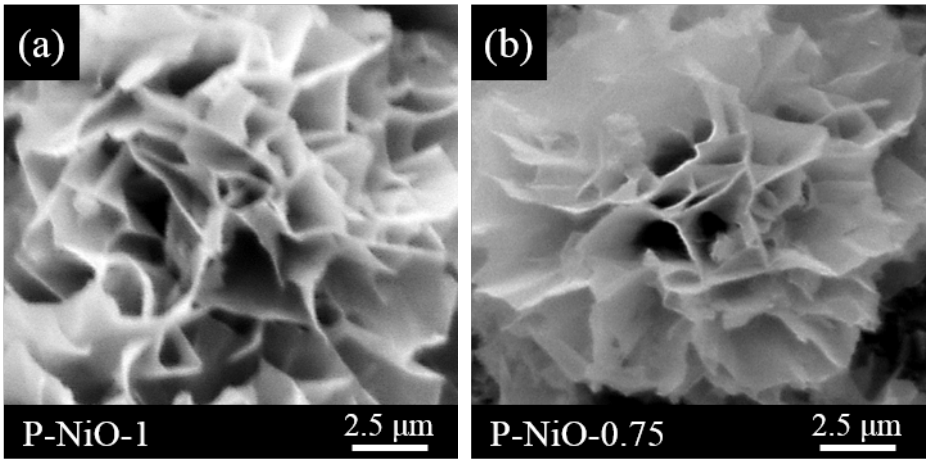

Figure S3. FE-SEM images of (**a**) P-NiO-1 and (**b**) P-NiO-0.75 before annealing process.

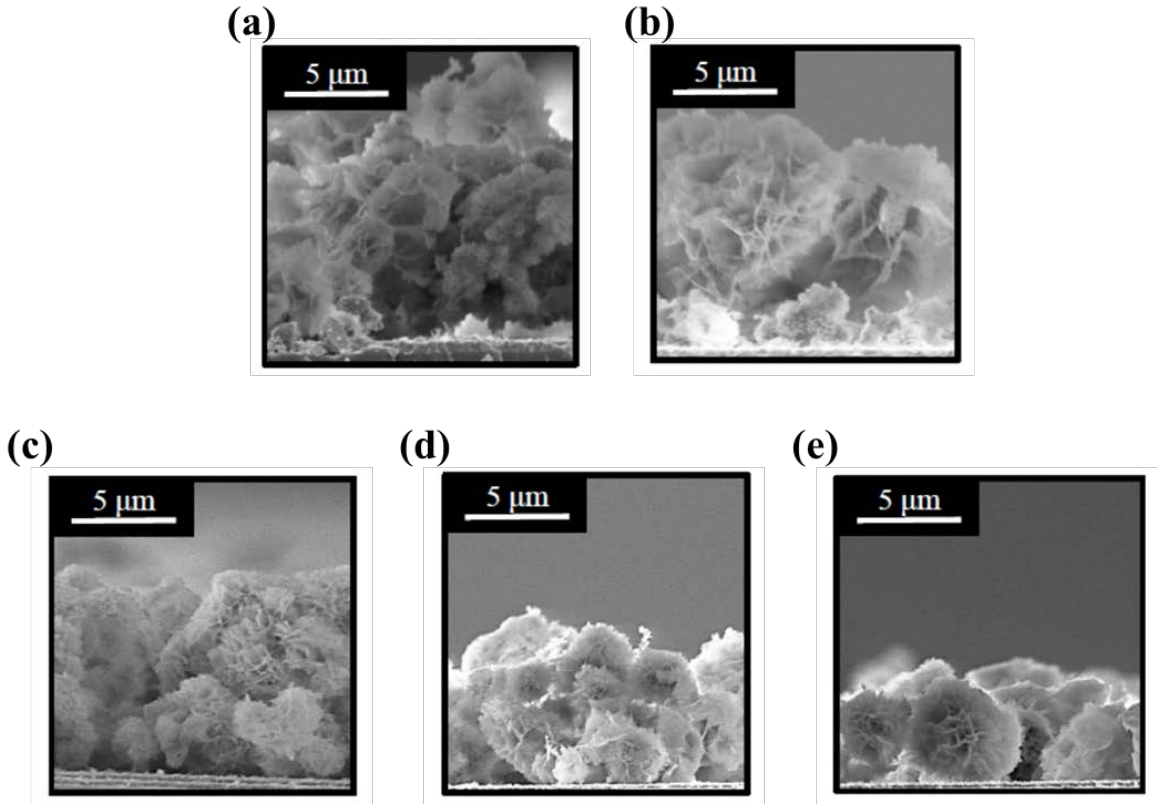

Figure S4. FE-SEM images of cross section of (**a**) P-NiO-1, (**b**) P-NiO-0.75 (**c**) P-NiO-0.5, (**d**) P-NiO-0.25, and (e) P-NiO-0.1.

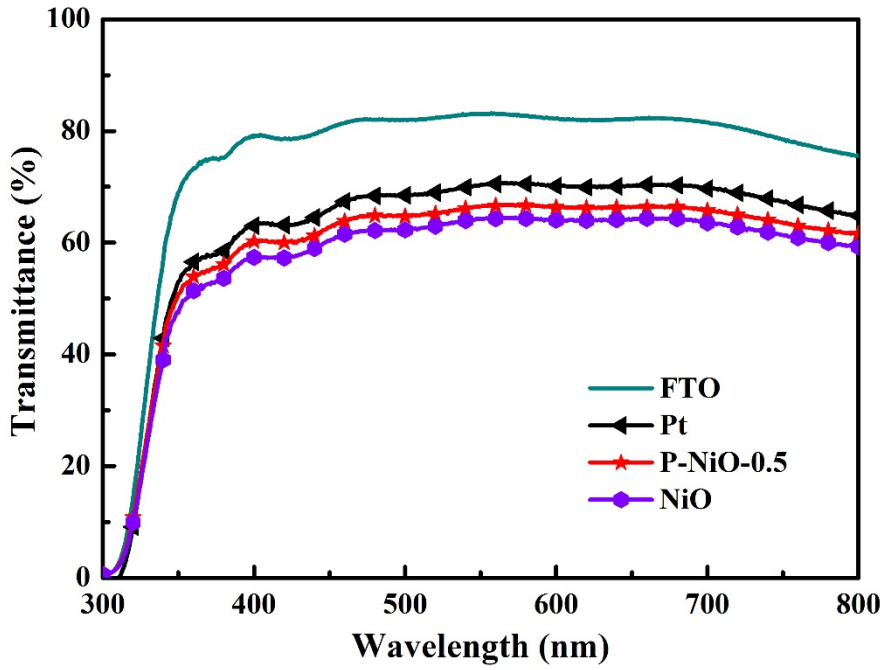

Figure S5. Transmittance spectra of various films.