

Supporting Information for “**Electron Transport and Recombination in Dye-Sensitized TiO₂ Solar Cells Fabricated without Sintering Process**”

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Table S1. I-V characteristics of DSCs using TiO₂ films prepared with and without sintering processes. One of them for each condition was the same shown in Table 1.

Sample	Thickness / μm	Voc / V	Isc / mAcm^{-2}	FF	Eff / %
450 °C _E50	4.0	-0.760	7.6	0.70	4.1
450 °C _E50	4.3	-0.773	8.3	0.71	4.5
450 °C _E25	4.0	-0.766	8.4	0.68	4.4
450 °C _E25	4.2	-0.748	7.6	0.70	4.0
450 °C _E15	4.0	-0.775	8.2	0.70	4.4
450 °C _E15	3.8	-0.778	7.5	0.70	4.1
80 °C _E50	3.6	-0.711	5.3	0.70	2.6
80 °C _E50	3.7	-0.688	5.5	0.71	2.7
80 °C _E25	3.7	-0.742	6.0	0.71	3.2
80 °C _E25	4.1	-0.721	5.0	0.72	2.6
80 °C _E15	4.2	-0.763	6.7	0.65	3.3
80 °C _E15	3.8	-0.739	6.1	0.71	3.2

Table S2. I-V characteristics of DSCs using TiO_2 films prepared with 450 °C heating process. The TiO_2 films were prepared from a colloidal suspension of P25 with Triton X and acetylacetone.^a

Sample	Thickness / μm	Voc / V	Isc / mAcm^{-2}	FF	Eff / %
450 °C _E50	3.9	-0.73	5.9	0.71	3.0
450 °C _E50	4.0	-0.71	5.7	0.70	2.8
450 °C _E25	3.7	-0.74	5.8	0.71	3.1
450 °C _E25	3.9	-0.74	6.0	0.71	3.2
450 °C _E15	3.9	-0.76	5.8	0.71	3.1
450 °C _E15	3.9	-0.75	5.9	0.71	3.1

^aThe additives made it easy to prepare films having flat surface, and usually it results in better reproducibility.

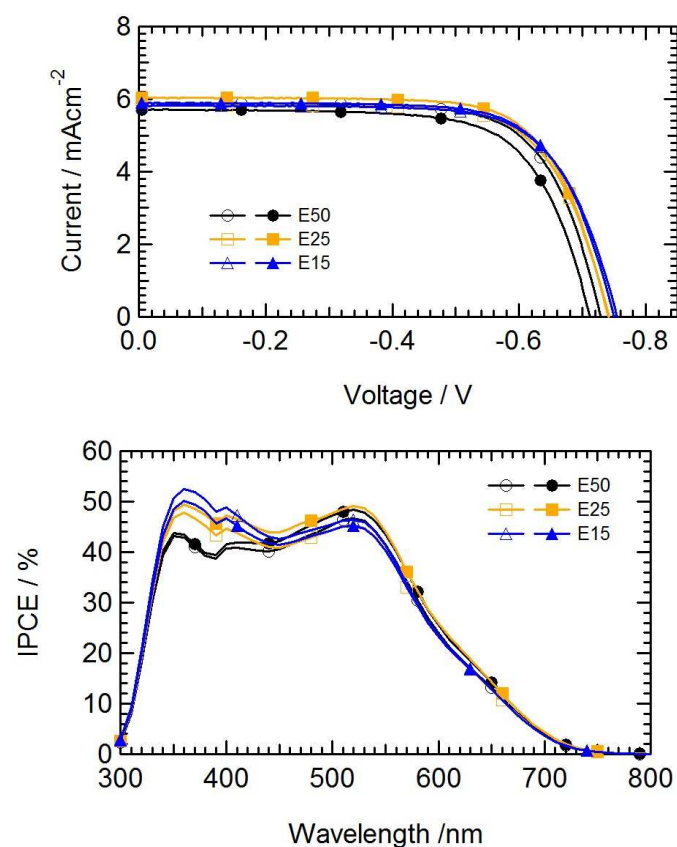


Figure S1. I-V curves and IPCE of the solar cells shown in Table S2.

In order to examine the effect of annealing temperature, colloidal suspension was prepared from P25 particles as it is purchased, and P25 particles heated without water at 450 °C for 30 min in air. This is to have P25 experience a condition of 450 °C. Then, the paste was applied to TCO and heated at 450 °C for 30 min or 80 °C for 12 hours. Table S3 summarizes the I-V characteristics of DSCs prepared from the electrodes. Figure S2 shows the diffusion coefficients, lifetime and electron density in the DSCs. Electrolyte was E50.

Table S3. I-V characteristics of DSCs measured under simulated one sun conditions.

Sample number	Heating temp. for particle / °C	Heating temp for film / °C	Thickness / μm	Voc / V	Isc / mAcm^{-2}	FF	Eff / %
641	450	450	4.1	-0.768	8.92	0.71	4.86
642	450	450	3.9	-0.756	8.32	0.70	4.43
643	450	450	4.4	-0.774	8.65	0.72	4.81
644	450	80	4.0	-0.744	6.85	0.72	3.67
645	450	80	4.0	-0.699	6.77	0.71	3.34
646	450	80	4.3	-0.744	7.60	0.72	4.09
651	N/A	450	4.2	-0.726	8.65	0.71	4.47
652	N/A	450	4.2	-0.750	9.24	0.71	4.92
653	N/A	450	4.2	-0.723	8.95	0.70	4.52
654	N/A	80	4.3	-0.762	7.17	0.73	3.99
655	N/A	80	4.1	-0.744	7.19	0.73	3.88
656	N/A	80	4.0	-0.699	7.14	0.71	3.57

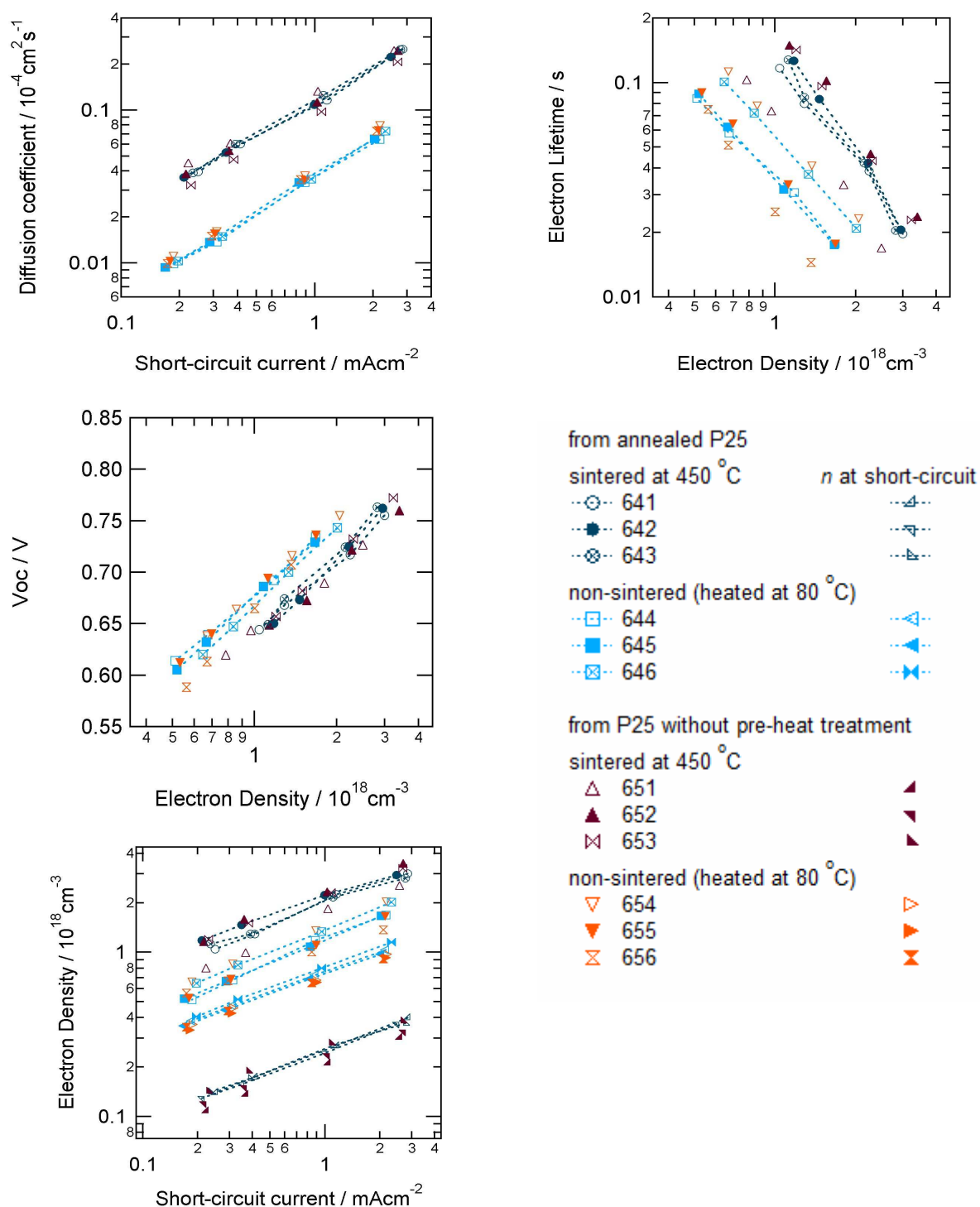


Figure S2. Electron Diffusion coefficient, lifetime and density in DSCs prepared from P25 particles with and without pre-heat treatment.