Supporting Information

for

Semi-automatic spray pyrolysis deposition of thin, transparent, titania films as blocking layers for dye-sensitized and perovskite solar cells

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Additional Experimental Data

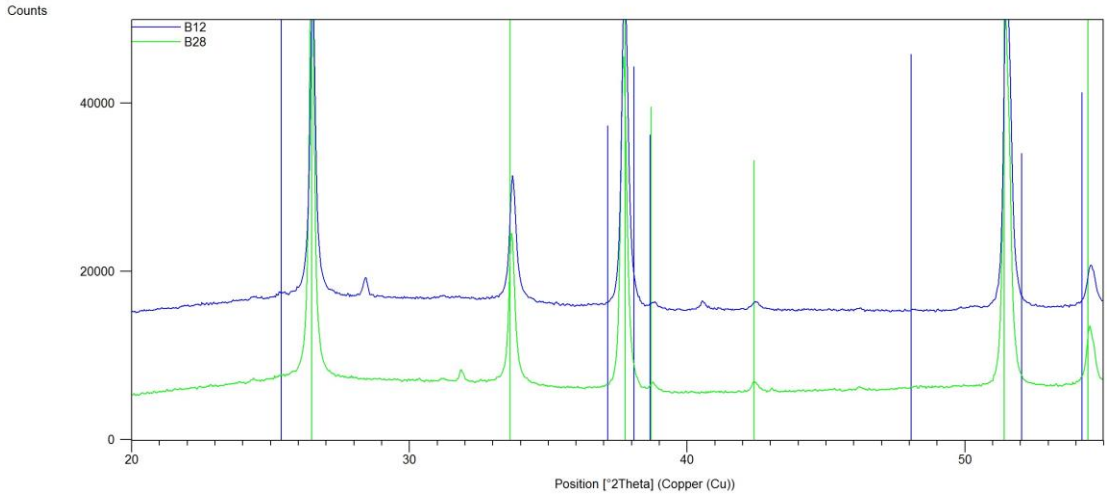

Figure S1: XRD patterns of an as-deposited (B28) and an annealed at 500 °C (B12) TiO_2 film on an FTO/glass substrate. Precursor 0.2 M TAA, deposition temperature 450 ºC, 70 Spray Cycles. Vertical lines: PDF card no. 04-003-3369 (green) and no. 04-006-1918 (blue) [S1].

Pattern List:

Ref. Code	Compound Name	Mineral Name	Chemical Formula
04-003-3369	Tin Oxide	Cassiterite, syn	SnO_2
04-006-1918	Titanium Oxide	Anatase, syn	TiO_2

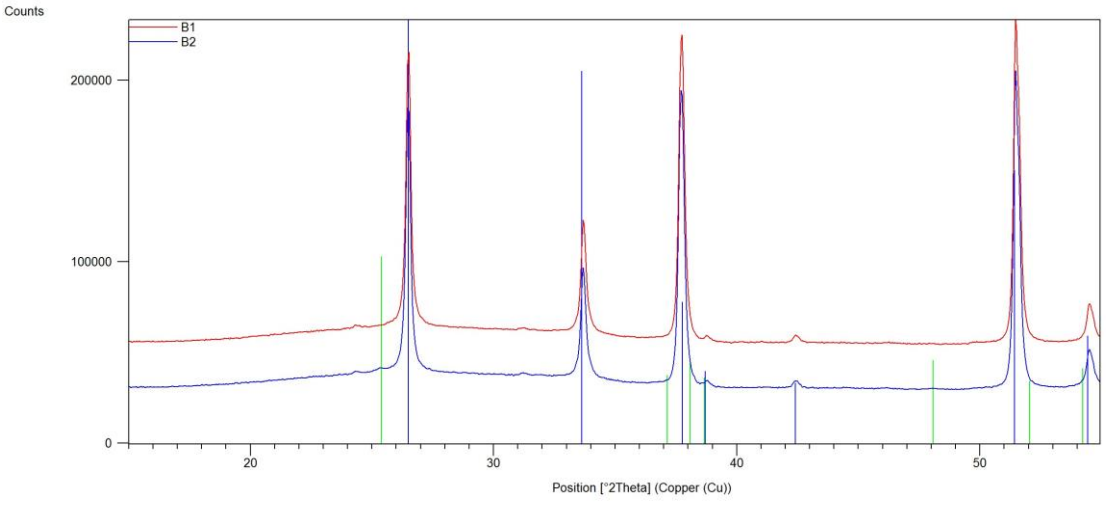

Figure S2: XRD patterns of an as-deposited (B1) and an annealed at 500 °C (B2) TiO_2 film on an FTO/glass substrate. Precursor 0.2 M TAA- AcAc, deposition temperature 450 ºC, 70 Spray Cycles. Vertical lines: PDF card no. 04-003-3369 (blue) and no. 04-006-1918 (green) [S1].

From the XRD analysis, anatase crystalline structure was not detected for any as-deposited TiO_2 films even those consisting of 70 SC (0.2 M TAA and 0.2 M TAA- AcAc), see Fig. S1 (sample B28) and Fig. S2 (sample B1). For post-calcined TiO_2 films, anatase can be detected only for films consisting of 70 SC (only one band (Θ = 25.4°), see Fig. S1. For TiO_2 films, consisting of 50 SC and less, anatase can not be detected even after post-calcination.

Similarly, XRD analysis of 70 SC TAA-AcAc film shows that band of anatase (Θ = 25.4°) is visible only after post-calcination, see Fig. S2, sample B2.

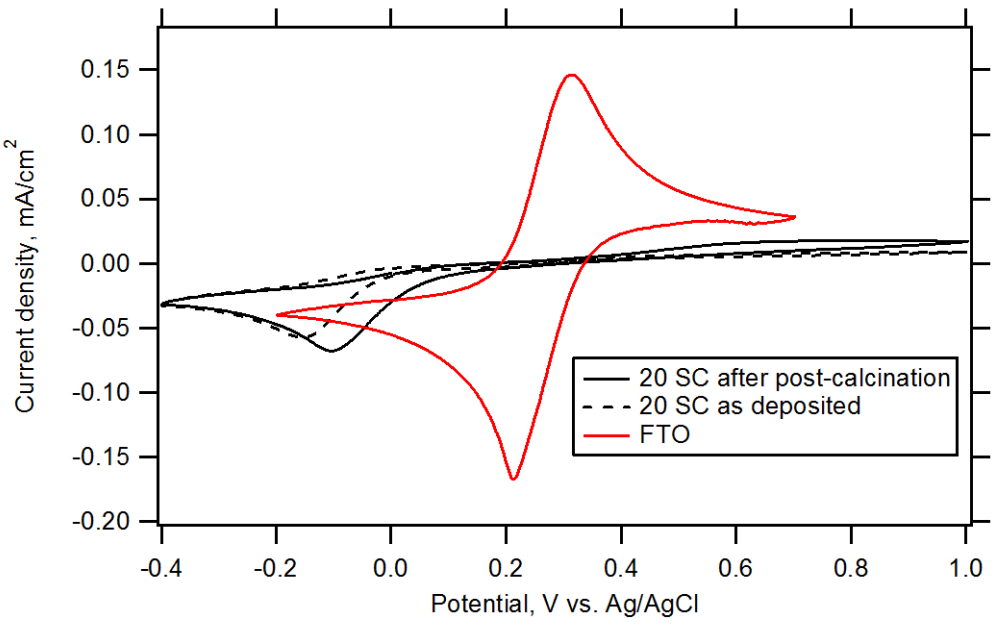

Figure S3: Cyclic voltammograms on a bare FTO(B) substrate and that covered by TiO_2 films consisting of 20 SC (0.2 M TAA). Scan rate 50 mV/s. Electrolyte solution was 0.5 mM $Fe(CN)_6^{3-/4-}$ in aqueous 0.5 M KCl, pH 2.5.

Table S1: Photocurrent densities at a potential of 1.2 V (vs. Ag/AgCl) for calcined TiO_2 film prepared from 0.05 M and 0.2 M TAA and from 0.2 M TAA – AcAc.

Substrate	precursor	No. of SC	j at 1.2 V (vs. Ag/AgCl) [μA cm^{-2}]
FTO(A)	0.05 TAA	200	385
FTO(B)	0.05 TAA	200	350
FTO(B)	0.2 TAA	20	390
FTO(B)	0.2 TAA	50	460
FTO(B)	0.2 TAA	70	470
FTO(B)	0.2 TAA-AcAc	70	520

References

[S1] ICDD (**2017**). "Powder Diffraction File," edited by S.Kabekkodu, International Centre for Diffraction Data, 12 Campus Boulevard, Newton Square, Pennsylvania 19073-3272.