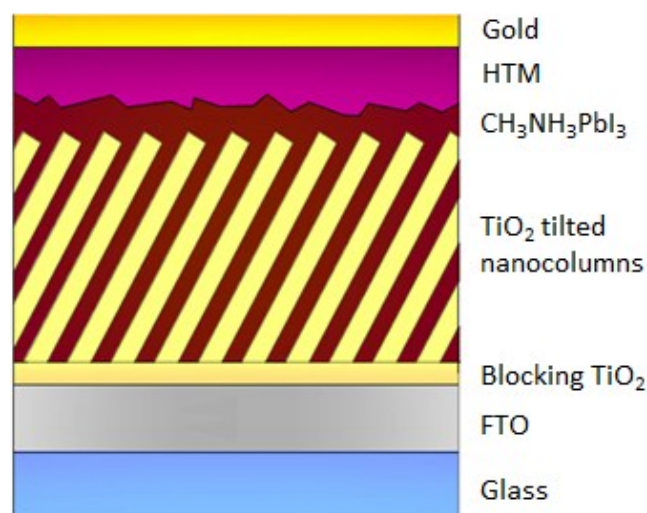
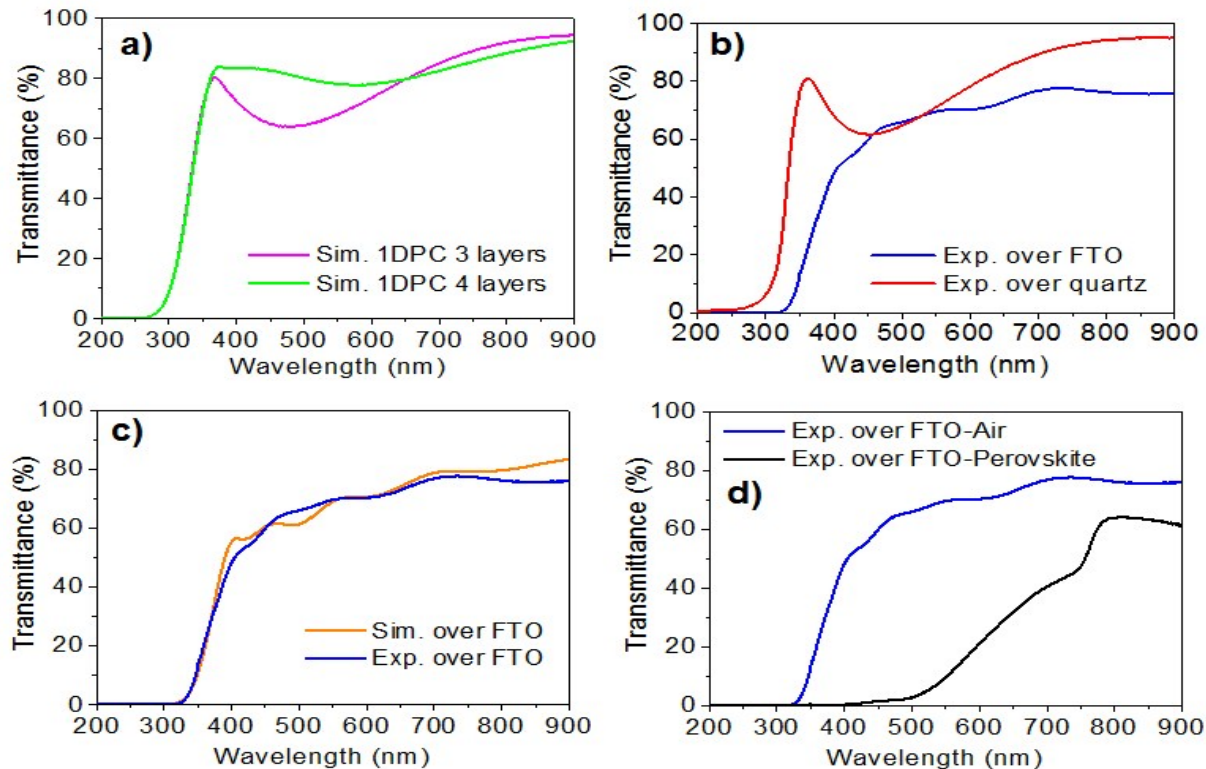


## Light Management: Porous 1-Dimensional Nanocolumnar Structures as effective Photonic Crystal for Perovskite Solar Cells

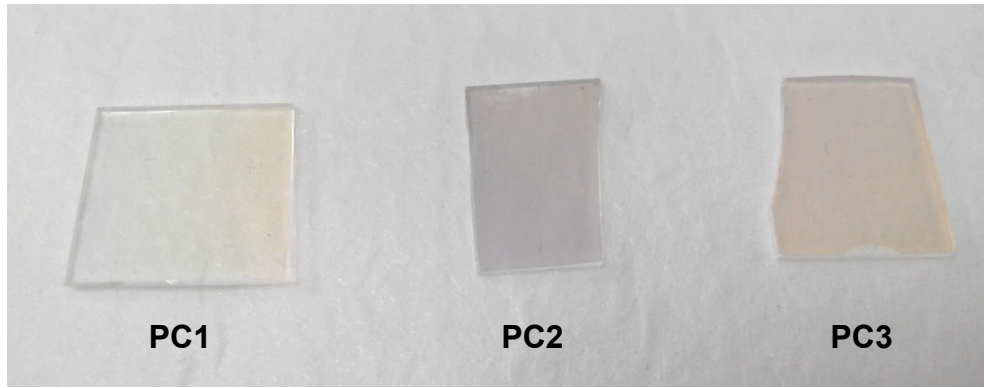
F. Javier Ramos,<sup>a</sup> Manuel Oliva-Ramírez,<sup>b</sup> Mohammad Khaja Nazeeruddin,<sup>c</sup> Michael Graetzel,<sup>c</sup> Agustín R. González-Elípe<sup>b</sup> and Shahzada Ahmad<sup>a</sup>



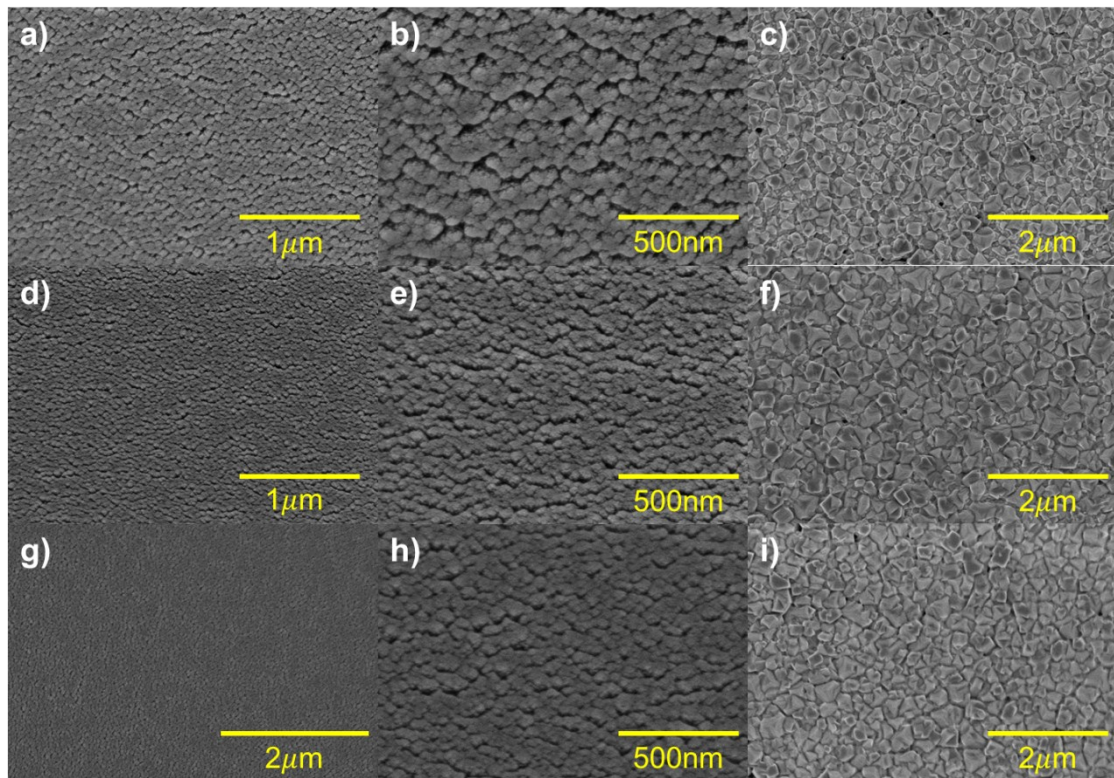
**Figure S1.** Schematic architecture of TiO<sub>2</sub> tilted nanocolumnar photoanodes deposited by PVD-OAD used as reference in this work. Taken from Ramos et al. (2015)<sup>1</sup>. Note that this plot is not at scale.



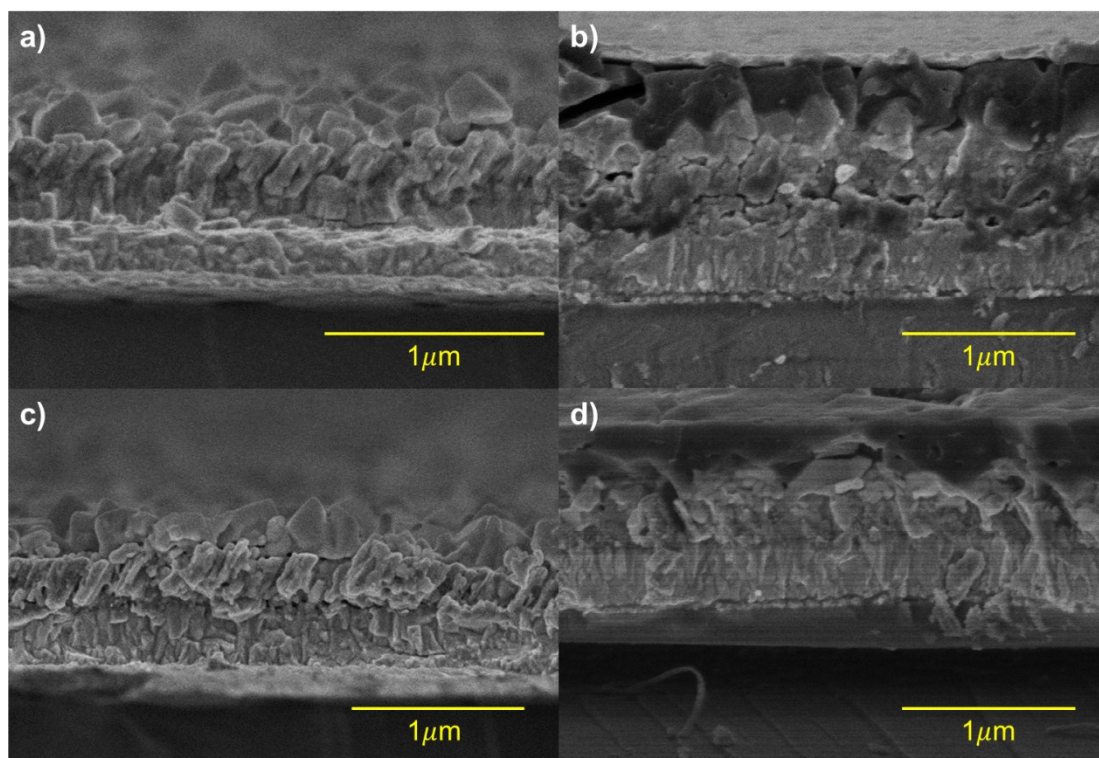
**Figure S2.** **a)** Transmission spectra for 1DPC Type 3, **b)** simulated spectrum of a PC Type 3 with 3 layers (TiO<sub>2</sub>-SiO<sub>2</sub>-TiO<sub>2</sub>) over quartz (pink) and a hypothetical PC similar to Type 3 with a fourth layer of SiO<sub>2</sub> (green), **b)** experimental transmission spectra of PC3 over quartz (red) and over FTO (blue), **c)** experimental transmission spectra of PC3 over FTO (blue) and its simulated one (orange line), **d)** experimental transmission spectra of PC3 over FTO before perovskite deposition (blue) and after perovskite infiltration (black).



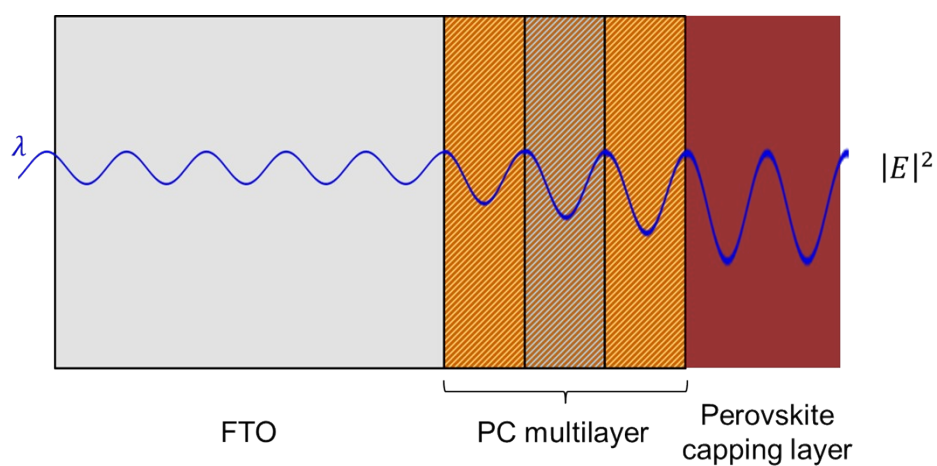
**Figure S3.** Photographs of the photonic crystal like structures fabricated over quartz substrates.



**Figure S4.** Top-view SEM for: **a)** and **b)** 1DPC Type 1 before perovskite deposition at different magnifications, **c)** perovskite film growth over the 1DPC Type 1, **d)** and **e)** 1DPC Type 2 before perovskite synthesis at different magnifications, **f)** perovskite film growth over the 1DPC Type 2, **g)** and **h)** 1DPC Type 3 before perovskite deposition under different magnifications, **i)** perovskite film deposited over the 1DPC Type 3.



**Figure S5.** Cross-sectional SEM for: **a)** 1DPC Type 2 after perovskite deposition, **b)** final perovskite solar cell containing 1DPC Type 2, **c)** 1DPC Type 3 after perovskite infiltration, **d)** finished perovskite solar cell containing 1DPC Type 3 as photoanode.



**Figure S6.** Schematic representation of the spatial distribution of the square amplitude of the electric field for a photonic crystal like structure composed of three porous layers of alternating refractive index materials with perovskite infiltrated inside over FTO.

1. F. J. Ramos, M. Oliva-Ramirez, M. K. Nazeeruddin, M. Grätzel, A. R. Gonzalez-Elipe, and S. Ahmad, *J. Mater. Chem. A*, 2015, **3**, 13291–13298.