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

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Figure S1. Schematic architecture of TiO$_2$ tilted nanocolumnar photoanodes deposited by PVD-OAD used as reference in this work. Taken from Ramos et al. (2015). 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$_2$-SiO$_2$-TiO$_2$) over quartz (pink) and a hypothetic PC similar to Type 3 with a fourth layer of SiO$_2$ (green), b) experimental transmission spectra of PC3 over quartz (red) and over FTO (blue), c) 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.