# Supporting Information

## Visible-light-driven photocatalytic carbon-doped porous ZnO nanoarchitectures for solar water-splitting**

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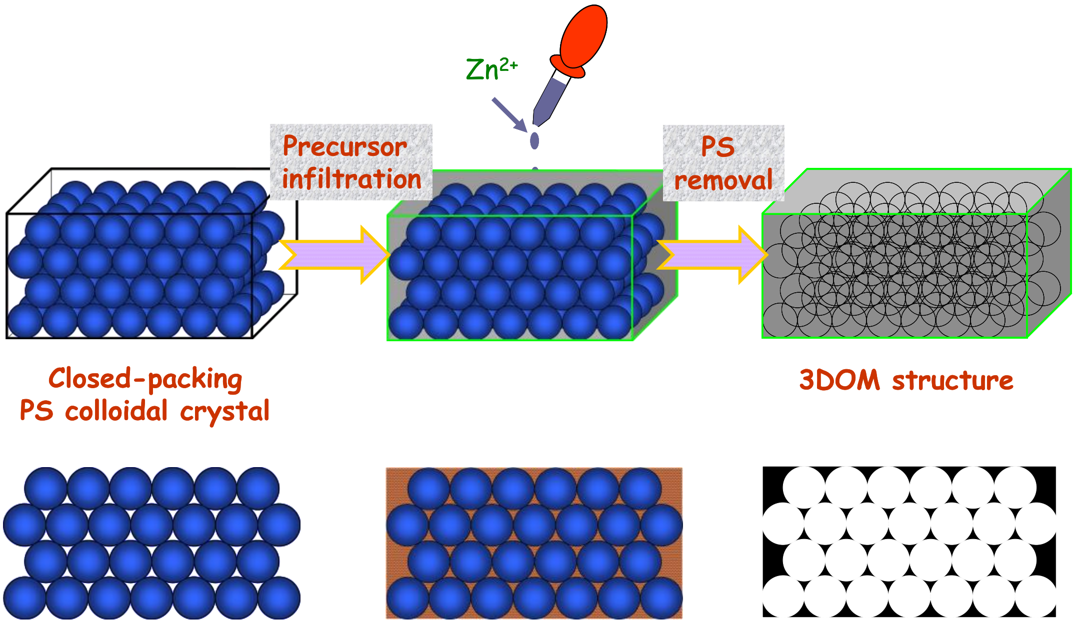

**Fig. SI 1** Procedure for the preparation of C-doped ZnO hierarchically porous nanoarchitectures using polystyrene colloidal crystal templates.

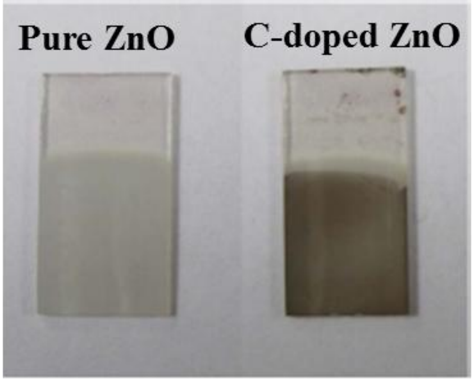

**Fig. SI 2** The photo image of pure ZnO and C-doped ZnO samples on ITO substrate.

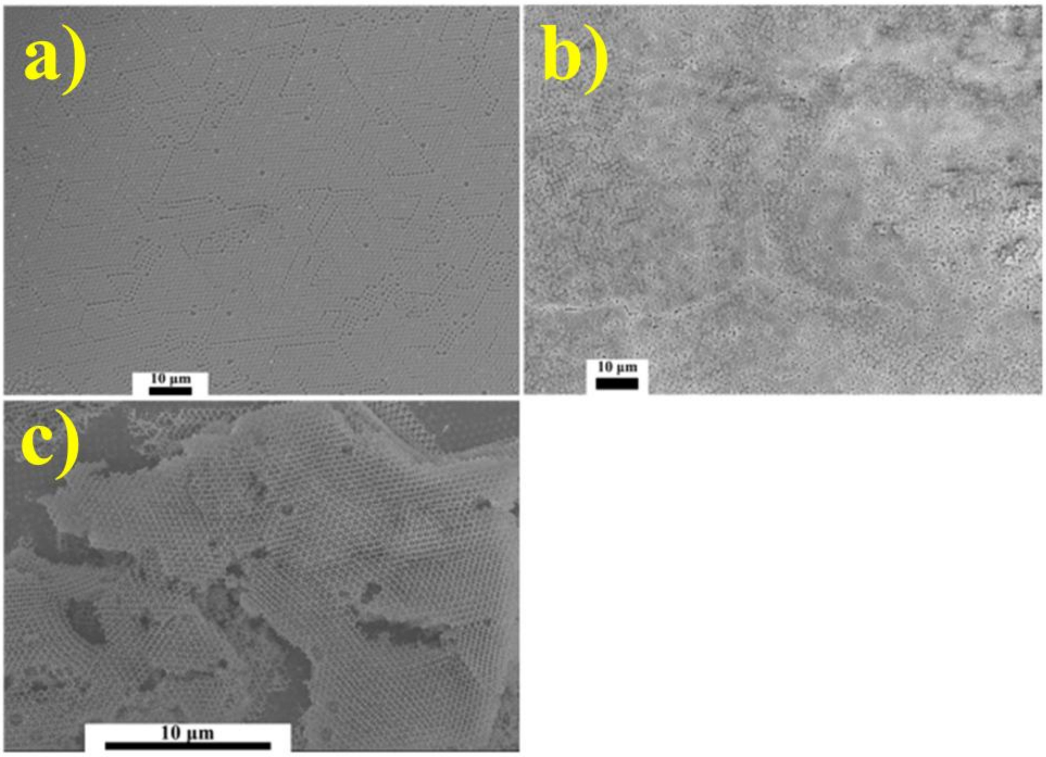

**Fig. SI 3** The low magnification images of (a) PS opals, pure ZnO porous structures (b) before and (c) after heating treatment.

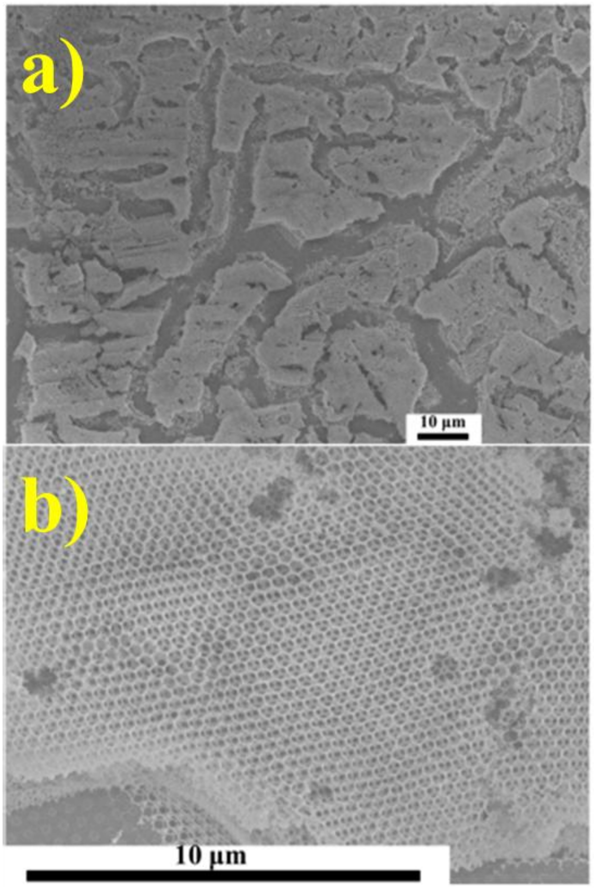

**Fig. SI 4** The low magnification images of C-doped ZnO porous structures.

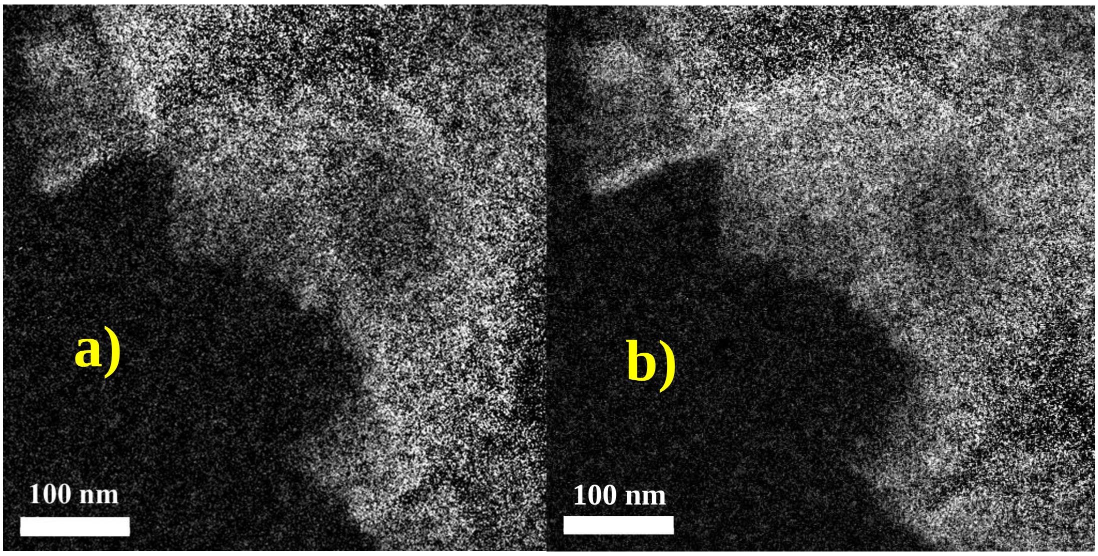

**Fig. SI 5** Corresponding energy-filtered TEM (a) zinc and (b) oxygen mapping images of C-doped ZnO hierarchically porous nanoarchitectures.

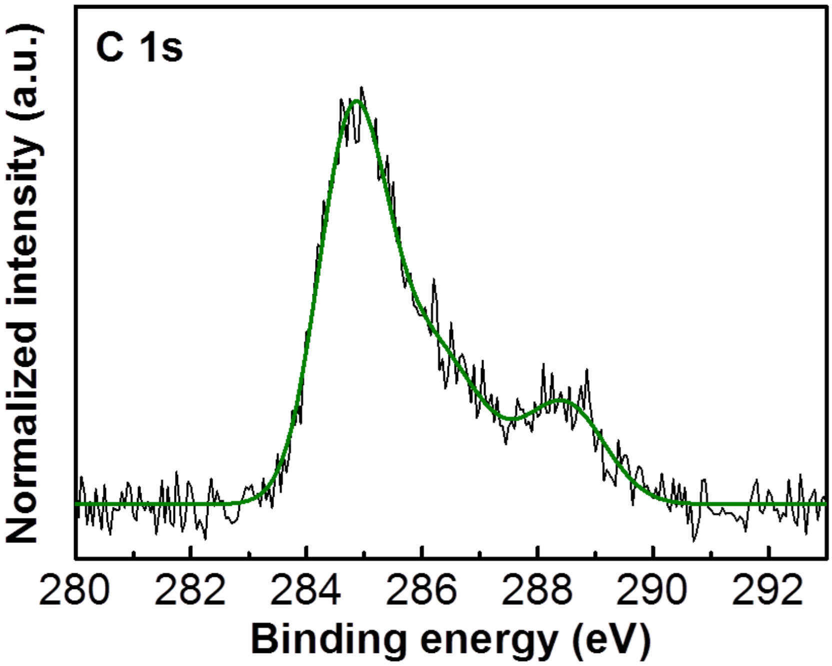

**Fig. SI 6** XPS spectrum of C 1s core-level regions for C-doped ZnO hierarchically porous nanoarchitectures after re-annealing treatment at 600℃(10 hr). If the carbon is not introduced into lattice (Zn or O site), such carbon species will be completely decomposed by the thermal oxidation of ZnO itself. In our case, a main peak and a shoulder peak in XPS spectrum of C 1s core-level regions could be clearly observed. The main peak arises from adventitious elemental carbon or graphite-like bonding, while the shoulder peak corresponds to C-O bonding species. This result indicates that the carbon is indeed introduced and existed at lattice rather than dangling carbon or other amorphous carbon species.

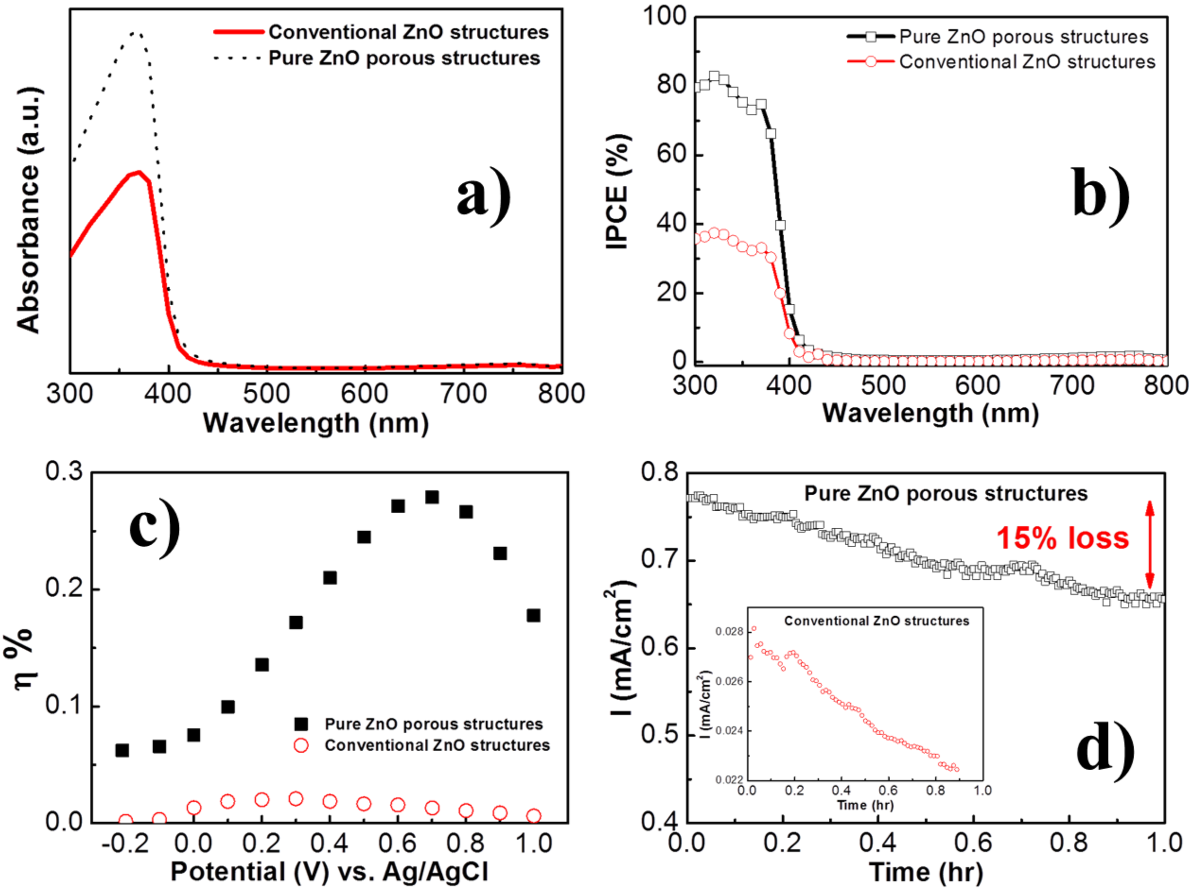

**Fig. SI 7** The (a) UV-vis spectra, (b) IPCE spectra, (c) photoconversion efficiency, and (d) stability data for conventional ZnO structures and pure ZnO hierarchically porous structures.