Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Design of Novel TiO_2-SiO_2 Core-Shell Helical Nanostructured Anti-Reflective Coatings on Cu(In,Ga)Se_2 Solar Cells with Enhanced Power Conversion Efficiency

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Table S1 The atomic concentration ratio of Ti 2p, Si 2p and O 1s, and the stoichiometry of the core and shell material.

Atomic Concentration Ratio				
Ti 2p	Si 2p	O 1s	Ti:O	Si:O
0.11	0.19	0.7	1 : 2.29	1 : 2.31

	TCO	With 150 nm TiO_2	With 150 nm TiO_2 + 3 nm SiO_2
Integral Area	104.64	72.94	71.80

Table S2 The integral area under the reflectance spectrum of TCO, with TiO_2 and with TiO_2-SiO_2 nanostructure.

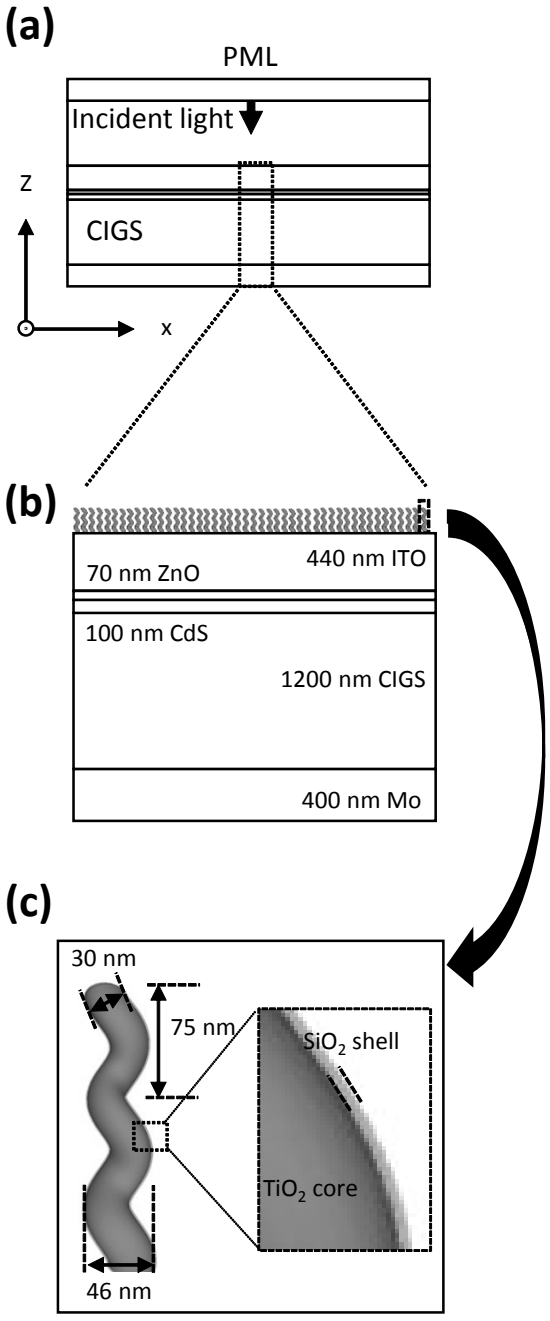

Fig. S1 (a) The side view (xy plane) of the overall construction of FDTD simulation, and the geometric parameters of (b) devices and (c) the TiO_2-SiO_2 core-shell nanostructure.

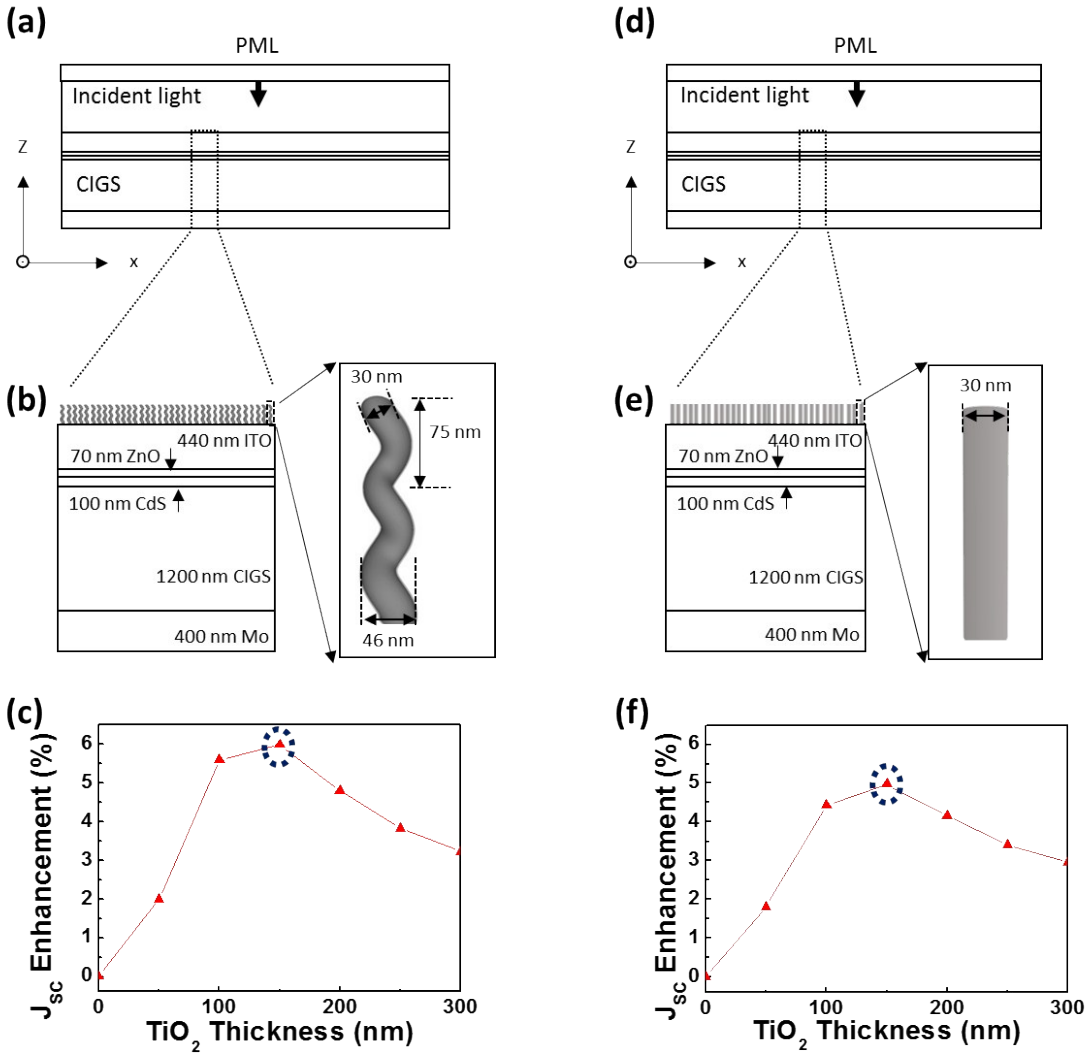

Fig. S2 (a) The side view (xy plane) of the overall construction of FDTD simulation and (b) the geometric parameters of the device with helical TiO_2 nanostructure. (c) The J_{SC} enhancement of the device with various thicknesses of helical TiO_2 nanostructure. (d) The side view (xy plane) of the overall construction of FDTD simulation and (e) the geometric parameters of the device with rod TiO_2 nanostructure. (f) The J_{SC} enhancement of the device with various thicknesses of helical TiO_2 nanostructure.

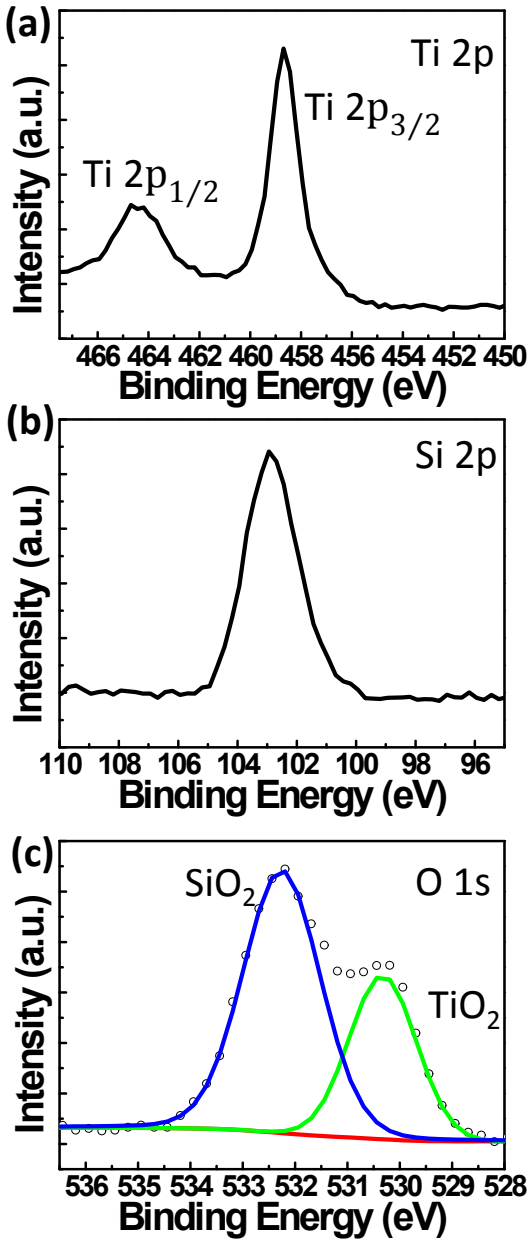

Figure S3 XPS spectra of (a) Ti 2p, (b) Si 2p and (c) O 1s.

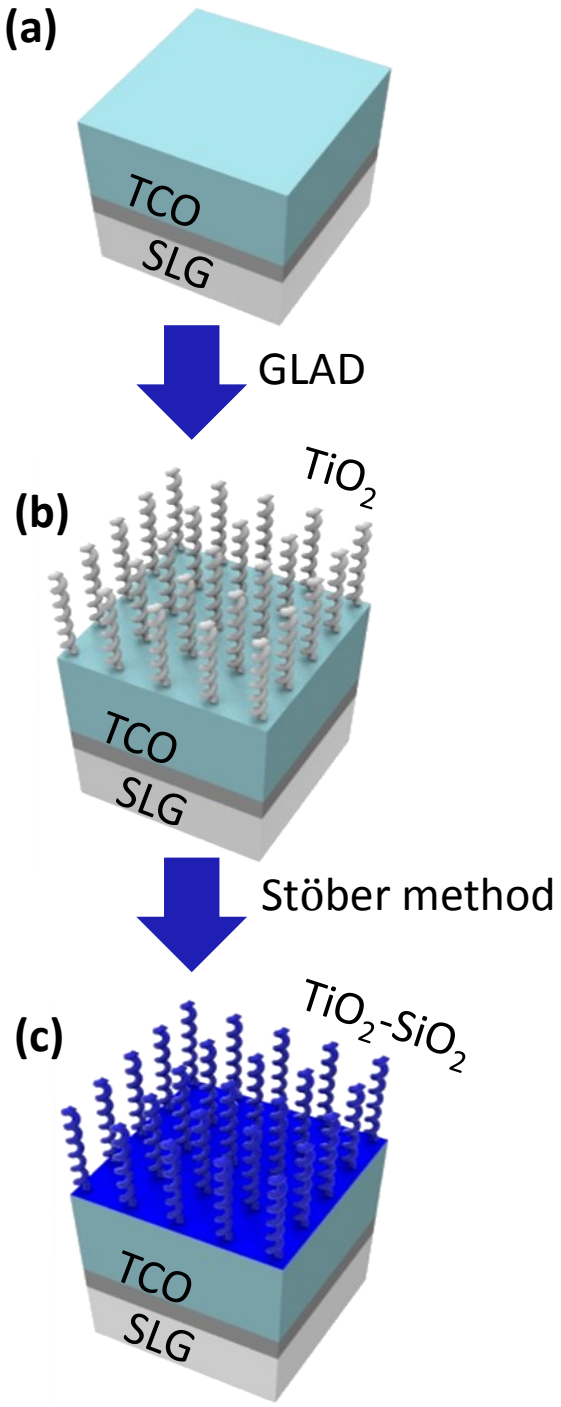

Figure S4 The schematic diagram of (a) the TCO, (b) TiO_2 deposited on the TCO and (c) TiO_2-SiO_2 deposited on the TCO for UV-Vis measurements.

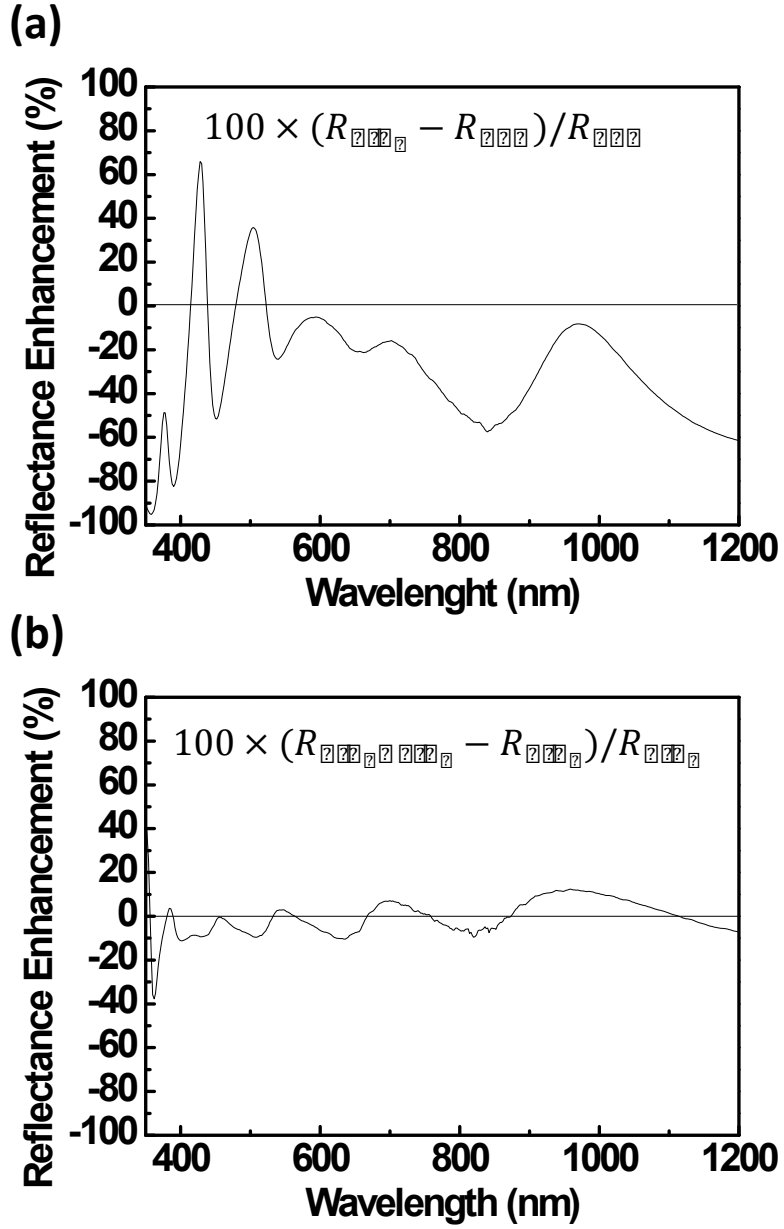

Figure S5 Reflectance enhancement spectra of the addition of (a) TiO_2 and (b) TiO_2-SiO_2 nanostructure.