Electronic Supplementary Information

Self-assembly of near-unity helical $Ce_{1-X}M_xO_2$ (x=0.1, M=Ni, Bi) solid solutions with tuneable optical activity

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1. Experimental method

1.1 Synthesis of $Ce_{1-x}M_xO_2$ nanostructures

All chemical regents are commercially available and without any further purification. Typically, in the synthesis of helical nanospindles-like $Ce_{0.9}Ni_{0.1}O_2$, 6 mmol $_L$-AspNa, 1.8 mmol cerium nitrate and 0.2 mmol nickel nitrate were dissolved in 10 ml deionized water, then 10 mL 0.15 M Na_2CO_3 was added to the mixture under stirring. Then stirring gently for 3h, the resulting suspension was hydrothermal treated at 160 ^oC for 24 h. The as-prepared products were washed with deionized water and ethanol twice, respectively. Then the result black slurry products were stay overnight at 60 ^oC in air. After calcinated at 450 ^oC in air for 3 h, a black gray $CeNiO_2$ powder was obtained.

For the preparation of $Ce_{0.9}Bi_{0.1}O_2$ nanospindles, all the other experimental procedures remained the same as described above, except for the nickel nitrate is replaced with bismuth nitrate.

1.2 Characterization

The crystallographic phases of the as-prepared simples were detected on a Rikagu D/max 2200PC, with Cu Kα radiation (λ=1.5406 Å). The morphology of the as-prepared simples was characterized by FE-SEM (FEI SIRION) and transmission electron microscopy (JEOL 2010 FEG). The composition of these samples was measured by inductively coupled plasma-atomic emission spectrometer (ICP-AES, USA Thermo Jarrell-Ash Corp. ICP-9000 (N+M)). Diffuse reflectance ultraviolet visible (DRUV) spectra was performed on a Shimadzu UV-3600 spectropolarimeter. DRCD spectra were recorded by a JASCO J-815 spectropolarimeter.

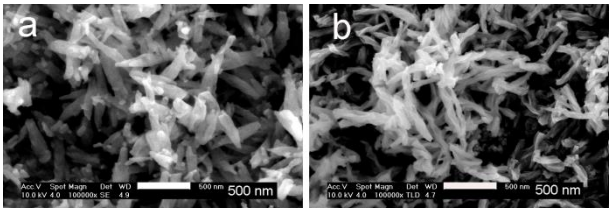

Figure S1. SEM images of Ce-compounds obtained after reaction at 160 ^{o}C for (a) 1 h and (b) 24 h.

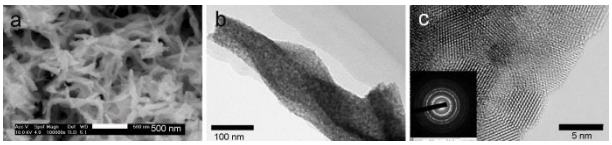

Figure S2. SEM images (a), TEM images (b), HRTEM images (c) and SAED (inset in c) of $Ce_{0.9}Zn_{0.1}O_2$.

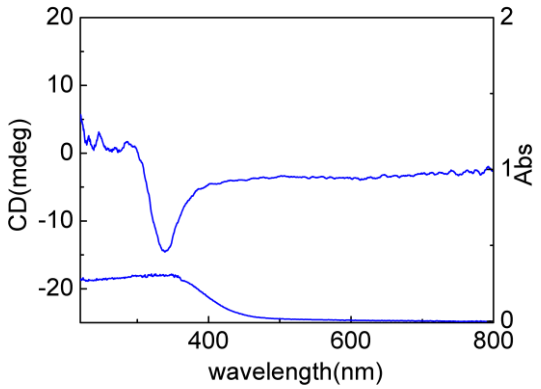

Figure S3. DRCD (top) and DRUV-vis (bottom) spectra of $Ce_{0.9}Zn_{0.1}O_2$.