*Supporting information*

# Direct Growth of Porous Crystalline $NiCo_2O_4$ Nanowire Arrays on Conductive Electrode for High-Performance Electrocatalytic Water Oxidation

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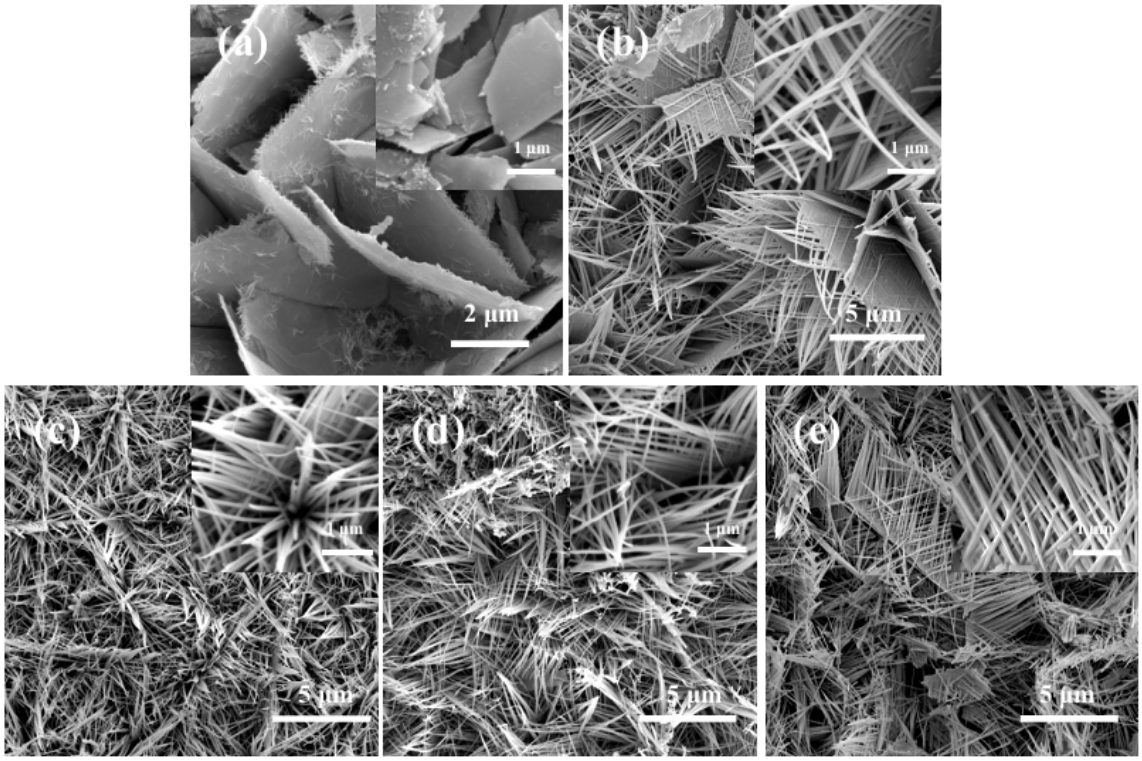


**Figure S1.** SEM images of the $NiCo_2O_4$ after calcinating at 350 ºC for 2 h in flowing argon with different times of the hydrothermal process at 120 ºC: (a) 2 h; (b) 4 h; (c) 6 h; (d) 10 h; (e) 15 h.

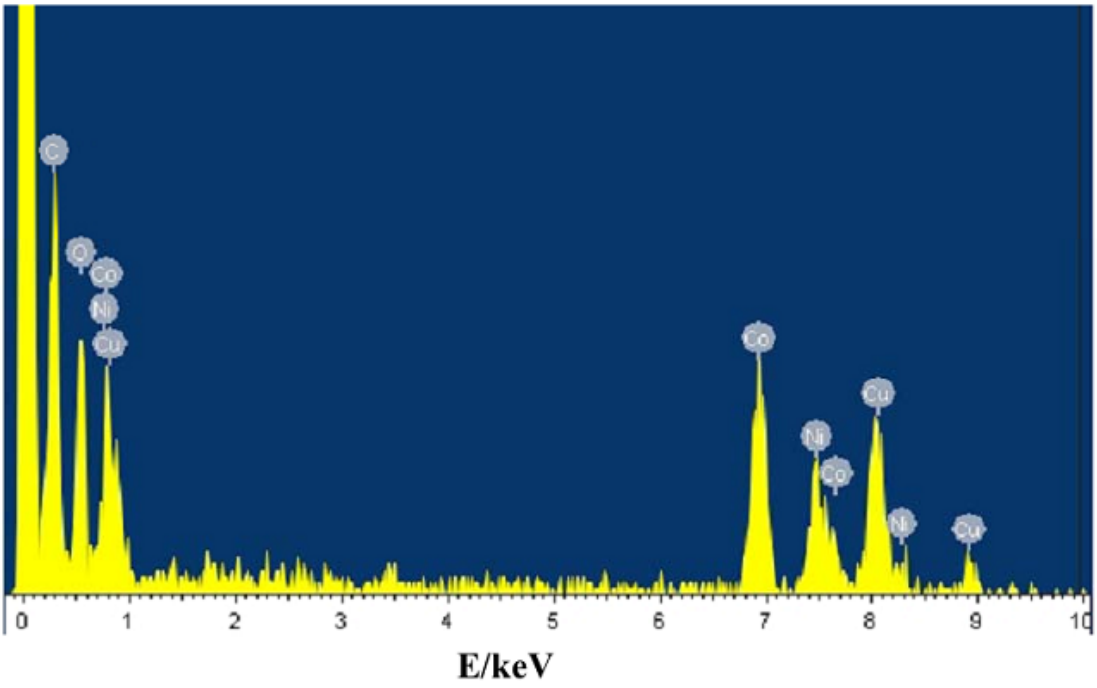


**Figure S2.** Typical EDX patterns of $NiCo_2O_4$ nanowires with 10 hours of the hydrothermal process at 120 ºC.

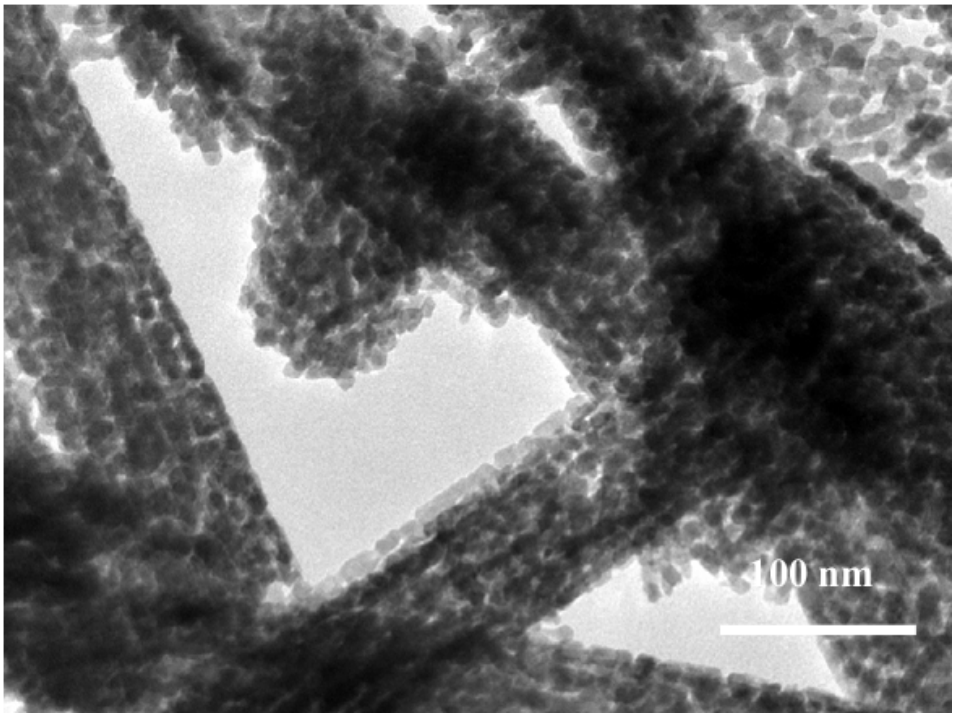


**Figure S3.** TEM image of $NiCo_2O_4$ nanowires with 10 hours of the hydrothermal process at 120 ºC.

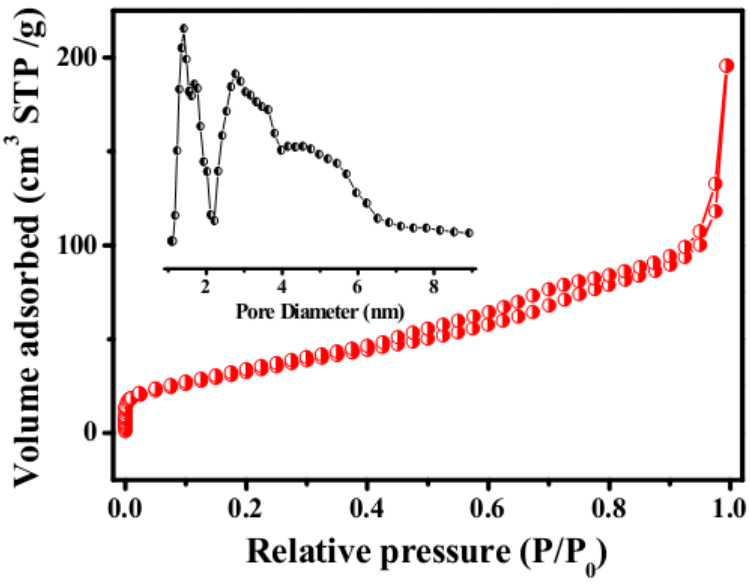


**Figure S4.** The corresponding nitrogen adsorption-desorption isotherm for the $NiCo_2O_4$ nanowires in BET measurements and pore-size distribution curves (inset).

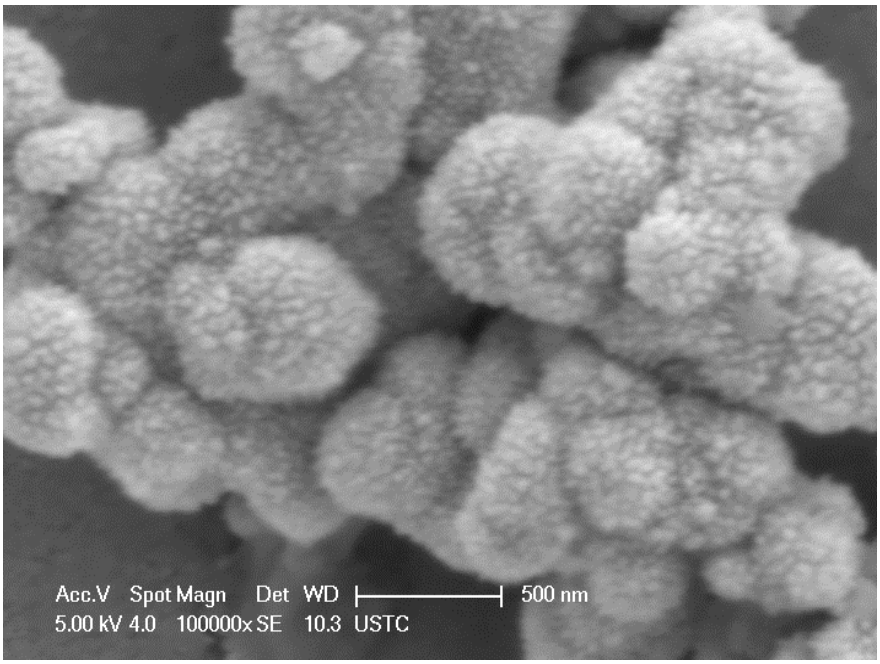


**Figure S5.** SEM image of the naosized $IrO_2$ catalyst.

**Table S1.** Comparison of different mixed transition-metal oxides for water oxidation reaction activity.

| **Materials** | **Onset Potential (V vs. RHE)** | **reference** |
|---|---|---|
| $Ni_xCo_{3-x}O_4$ Nanowire Arrays | 1.62 | Adv. Mater., 2010,22,1926 |
| $Zn_xCo_{3-x}O_4$ Nanoarrays | 1.55 | Chem. Mater., 2014, 26, 1889 |
| Three-dimensional NiFe-LDH | 1.48 | Chem. Commun., 2014, 50, 6479 |
| PNG-NiCo | 1.54 | ACS Nano, 2013,7,10190 |
| $NiCo_2O_4$ Nanowire Arrays | 1.52 | This work |