Porous Co$_3$O$_4$/SnO$_2$ quantum dots (QDs) heterostructure with abundant oxygen vacancies and Co$^{2+}$ ions for highly efficient gas sensing and oxygen evolution reaction

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Fig. S1 One of the prepared gas sensor.

Fig. S2 High-resolution TEM images of SnO$_2$QDs
Fig. S3 $N_2$ adsorption-desorption isotherm exhibits a typical Langmuir hysteresis indicating presence of well-defined mesopores.

Fig. S4 Co 2p XPS spectra of $Co_3O_4/\text{SnO}_2$ QDs heterostructures and $Co_3O_4$ nanosheets
Fig. S5 ESR spectra of Co$_3$O$_4$ nanosheet and Co$_3$O$_4$/SnO$_2$QDs (1:1) heterostructures.

Fig. S6 Stability of the Co$_3$O$_4$/SnO$_2$QDs (1:1) heterostructures with an initial LSV polarization curve and after 1000 cycles in 1 M KOH at a scan rate of 0.01 V/s; b) a current-time curve obtained for OER in the presence of Co$_3$O$_4$/SnO$_2$QDs (1:1) heterostructures at 1.61 V vs. NHE.
Fig. S7 Cyclic voltammetry curves of the as-prepared samples at scan rates of 20, 40, 60, 80, 100, 120, 140, 160, 180 and 200 mV s\(^{-1}\).