Supplementary Information

**Fig. S1** Optical microscope images of (a) bare Pt/IDEs and (b) SnS$_2$ NFs coated Pt/IDEs. (c) X1000 magnification FESEM image of SnS$_2$ NFs.
Fig. S2 Experimental setup for gas sensing measurement under LED illumination: (a) dark, (b) red, (c) orange, (d) green, (e) cyan and (f) blue.
Fig. S3 N$_2$ adsorption-desorption isotherm plot of the SnS$_2$ NFs. The inset shows pore size distribution.
Fig. S4 XRD spectra of SnS$_2$ NFs with different RTA conditions.
Fig. S5 Gas sensing curves of SnS$_2$ NFs under (a) dark condition, (b) orange, (c) cyan and (d) UV light illumination.
Fig. S6 Gas sensing curves of SnS$_2$ NFs under blue light illumination with different RTA conditions.
Fig. S7 Gas sensing curves of SnS$_2$ NFs under blue light illumination to 5 ppm of NO$_2$, 50 ppm of NH$_3$, 50 ppm of C$_2$H$_5$OH, 50 ppm of CH$_3$COCH$_3$, 50 ppm of H$_2$, and 5 ppm of H$_2$S.
Fig. S8 Resistance curves under blue light illumination at different RH conditions: (a) 10%, (b) 30%, (c) 50% and (d) 80% RH.