Supporting Information
For

Effect of heterointerface on NO$_2$ sensing properties of in-situ formed TiO$_2$ QDs-decorated NiO nanosheets

Congyi Wu,$^{a,b}$ Jian Zhang,$^a$ Xiaoxia Wang,$^a$ Changsheng Xie,$^a$ Songxin Shi,$^{*,b}$ and Dawen Zeng,$^{*,ac}$

$^a$State Key Laboratory of Material Processing and Die & Mould Technology, School of Materials Science and Engineering, Huazhong University of Science and Technology (HUST), Wuhan 430074, P. R. China

$^b$National Engineering Research Center of Manufacturing Equipment Digitization, HUST, No. 1037, Luoyu Road, Wuhan 430074, China

$^c$Hubei Collaborative Innovation Center for Advanced Organic Chemical Materials, Hubei University, Wuhan 430062, P. R. China

*Corresponding author.

*E-mail: shisx@mail.hust.edu.cn (Songxin Shi) & dwzeng@mail.hust.edu.cn (Dawen Zeng)
Fig. S1. Schematic illustration of the synthesis procedure of the TiO$_2$-NiO nanocomposites.

Fig. S2. The schematic diagram of sensor substrate.
Fig. S3. (a) The responses of the 5TiO₂QDs-NiO towards various gases (5 ppm for NO₂, 100 ppm for the rest). (b) The repeatability of the 5TiO₂QDs-NiO towards 60 ppm NO₂.

Fig. S4. (a) XRD patterns of the NiO nanosheets and the TiO₂QDs-NiO nanohybrids; (b) Atomic concentration of Ti 2p of the TiO₂QDs-NiO nanohybrids; XRD patterns of (c) the 20TiO₂15-NiO and (d) the 50TiO₂30-NiO.
Fig. S5. O 1s spectra of (a) the bare mesoporous NiO, (b) 1TiO₂QDs-NiO, (c) 2TiO₂QDs-NiO, (d) 5 TiO₂QDs-NiO, (e) 10 TiO₂QDs-NiO from XPS.
**Fig. S6.** O 1s spectra of (a) 50TiO$_2$30-NiO, (b) 20TiO$_2$15-NiO, (c) 5 TiO$_2$QDs-NiO from XPS.

**Fig. S7.** With the increase of TiO$_2$ nanoparticle size, comparison between the variation of the maximum responses to 60 ppm NO$_2$ and the variation of the peak area ratio of Ni-O-Ti.
Fig. S8. Dynamic sensitivity-recovery curves of TiO$_2$ QDs to 100ppm NO$_2$.

Fig. S9. The Resistance of the nanohybrids with different addition quantity of TiO$_2$ QDs.