

Supplementary Information

**1T and 2H Mixed Phase WS<sub>2</sub> Nanoflakes decorated Quasicrystal  
Nanosheets for NO<sub>2</sub> Sensors**

*Sumit Kumar<sup>†</sup>, Mustaque A. Khan<sup>†</sup>, Shashank Shekhar Mishra<sup>2</sup>, Rajneesh Chaurasiya<sup>3,4</sup>, Nipun  
Sharma<sup>1</sup>, Meng Gang<sup>5</sup>, Chandra S. Tiwary<sup>6</sup>, Krishanu Biswas<sup>2,\*</sup>, Mahesh Kumar<sup>1\*</sup>*

*<sup>1</sup>Department of Electrical Engineering, Indian Institute of Technology Jodhpur, Jodhpur, India-  
342037*

*<sup>2</sup>Department of Materials Science and Engineering, Indian Institute of Technology Kanpur, Kanpur  
India-208016*

*<sup>3</sup>Department of Physics, Indian Institute of Technology Jodhpur, Jodhpur 342037, India*

*<sup>4</sup>Department of Electronics and Communication Engineering, Amrita School of Engineering, Amrita  
Vishwa Vidyapeetham, Chennai 601103, India.*

*<sup>5</sup>Anhui Provincial Key Laboratory of Photonic Device and Materials, Anhui Institute of Optics and  
Fine Mechanics, Chinese Academy of Sciences, Hefei 230031, China*

*<sup>6</sup>Department of Metallurgical and Materials Engineering, Indian Institute of Technology Kharagpur,  
Kharagpur India- 721302*

\* Corresponding Author:

Krishanu Biswas: [kbiswas@iitk.ac.in](mailto:kbiswas@iitk.ac.in)

Mahesh Kumar: [mkumar@iitj.ac.in](mailto:mkumar@iitj.ac.in)

† Contributed equally

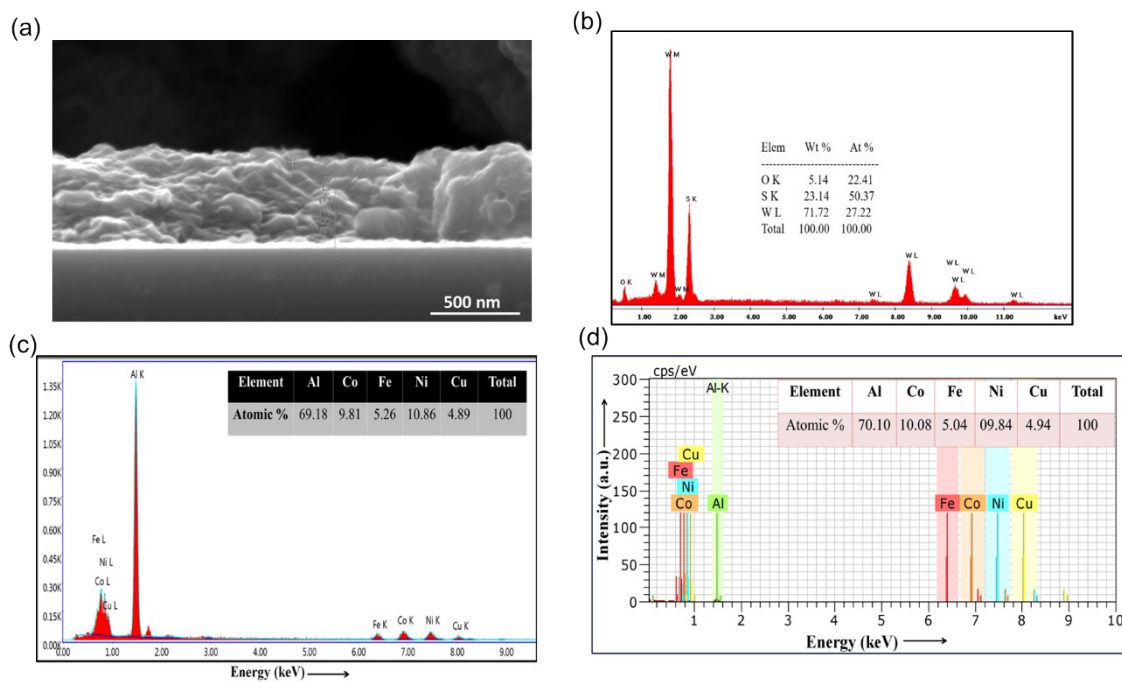
## Supporting contents:

**Fig. S1:** (a) FESEM cross sectional image of WS<sub>2</sub> layer. (b) EDS profile of as prepared synthesis WS<sub>2</sub>. (c, d) SEM and TEM EDS profiles of synthesis 2D Quasicrystal.

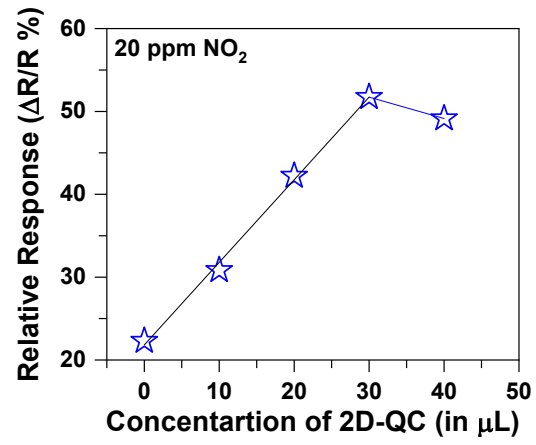
**Fig. S2:** Relative response curves of the WS<sub>2</sub> and 2D QCs/WS<sub>2</sub> devices to 20 ppm NO<sub>2</sub> exposure at 100 °C.

**Fig. S3** (a-f) Temporal response curve for the cross-sensitivity of the devices (WS<sub>2</sub> and different concentration of 2D QC decorated WS<sub>2</sub> devices) towards various NO<sub>2</sub>, SO<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub> and CO gases at 125°C.

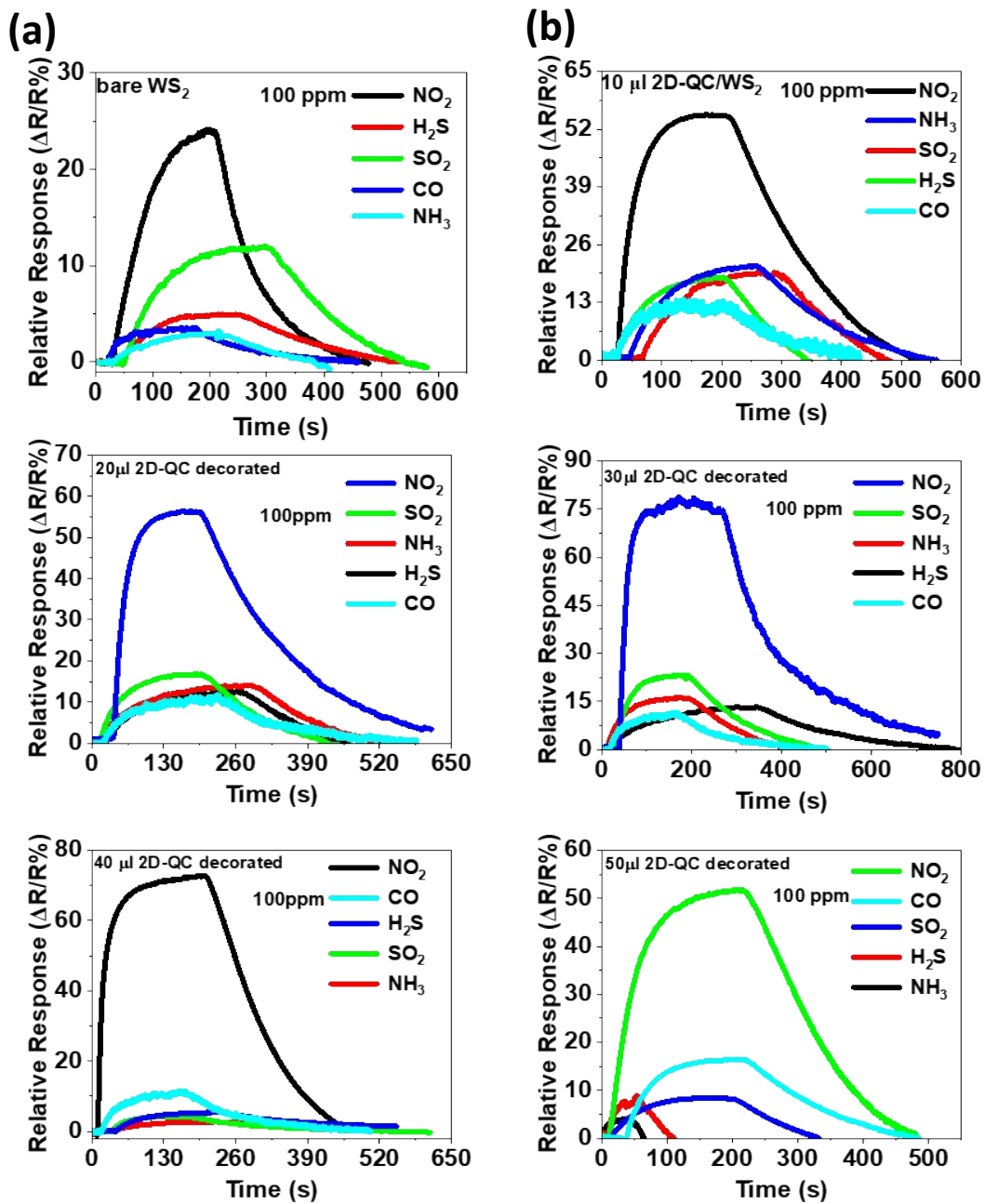
**Fig.S4** Linear fitting of response and LoD calculation of WS<sub>2</sub> and 30 μl 2D QC/WS<sub>2</sub> sensor toward various concentrations of NO<sub>2</sub> (1–20 ppm) at 100°C.



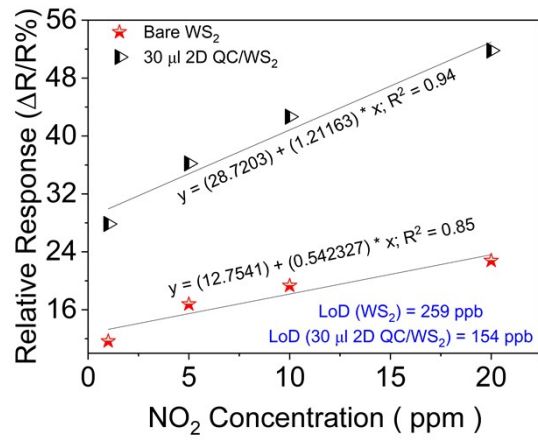
**Fig. S1** (a) FESEM cross-sectional image of WS<sub>2</sub> layer. (b) EDS profile of as-synthesized WS<sub>2</sub>. (c, d) SEM and TEM EDS profiles of synthesized 2D Quasicrystal sheet.



**Fig. S2** relative response curves of the WS<sub>2</sub> and 2D-QCs/WS<sub>2</sub> devices to 20 ppm NO<sub>2</sub> exposure at 100 °C.



**Fig. S3** (a-f) Temporal response curve for the cross-sensitivity of the devices (WS<sub>2</sub> and different concentrations of 2D QC decorated WS<sub>2</sub> devices) towards various NO<sub>2</sub>, SO<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub> and CO gases at 125°C.



**Fig.S4** Linear fitting of response and LoD calculation of WS<sub>2</sub> and 30 µl 2D QC/WS<sub>2</sub> sensor toward various concentrations of NO<sub>2</sub> (1–20 ppm) at 100°C.