Electronic Supplementary Material (ESI) for Nanoscale.
This journal is © The Royal Society of Chemistry 2024

Catalytic synergy of WS_2 anchored $PdSe_2$ for highly sensitive hydrogen gas sensor

Suresh Kumar[a], Ashok Kumar[b], Amit Kumar[b], Atul G. Chakkar[c], Atanu Betal[a], Pradeep Kumar[c], Satyajit Sahu[a,*], Mahesh Kumar[b, d*]

[a]*Department of Physics, Indian Institute of Technology Jodhpur, Jodhpur 342030, India*

[b]*Department of Electrical Engineering, Indian Institute of Technology Jodhpur, Jodhpur 342030, India*

[c]*School of Physical Sciences, Indian Institute of Technology Mandi, Mandi 175005, India*

[d]*Department of Cybernetics, Nanotechnology and Data Processing, Faculty of Automatic Control, Electronics and Computer Science, Silesian University of Technology, Akademicka 16, 44-100 Gliwice, Poland*

[*]Corresponding authors: Mahesh Kumar: mkumar@iitj.ac.in,Satyajit Sahu: satyajit@iitj.ac.in

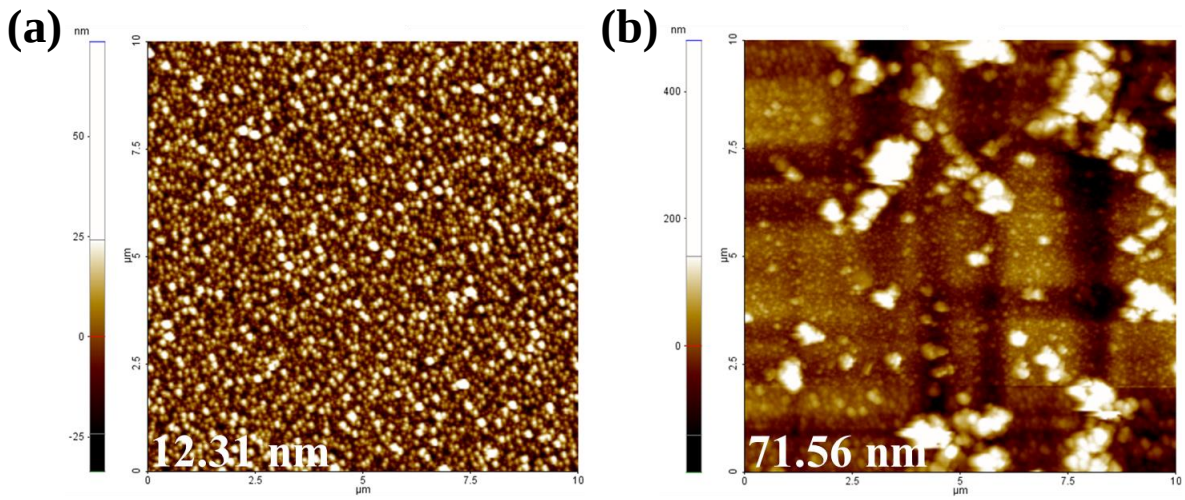

Fig. S1 AFM images (a) pristine $PdSe_2$ and (b) WS_2 decorated $PdSe_2$ thin film

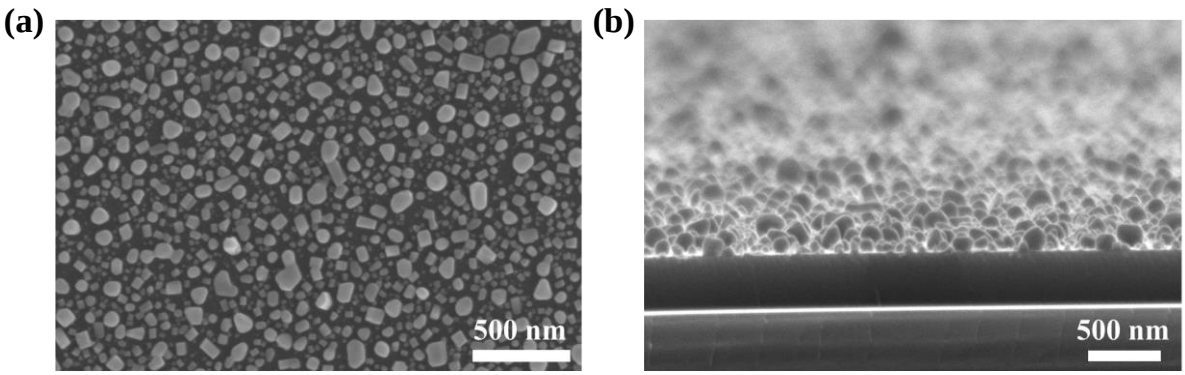

Fig. S2 FE-SEM images (a) pristine $PdSe_2$ and (b) cross-sectional image of pristine $PdSe_2$

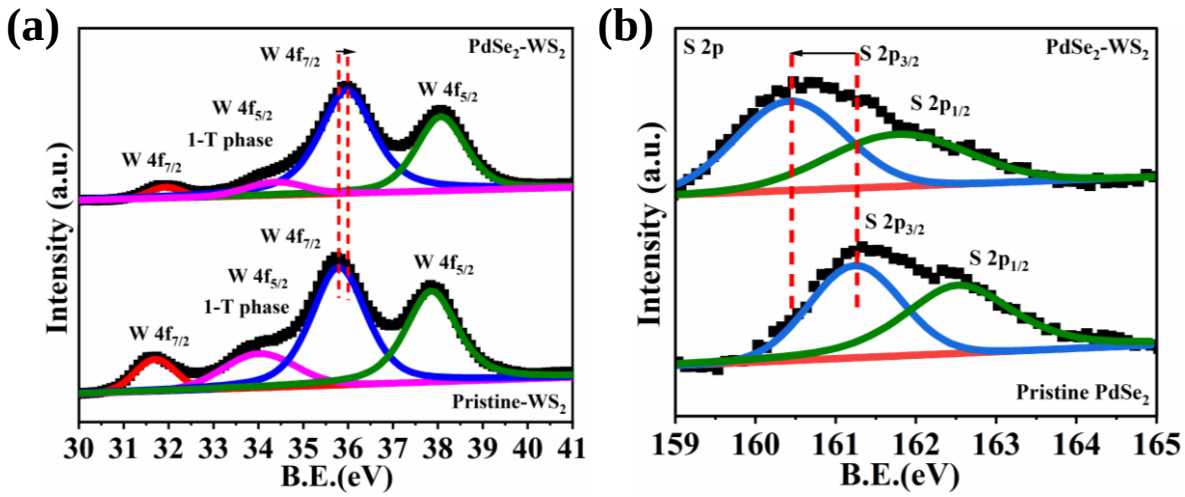

Fig. S3 XPS core level spectra of (a) W $4f_{7/2}$ and W $4f_{5/2}$ (d) S $2p_{3/2}$ and S $2p_{1/2}$ of pristine WS_2 and WS_2 anchored $PdSe_2$, respectively.

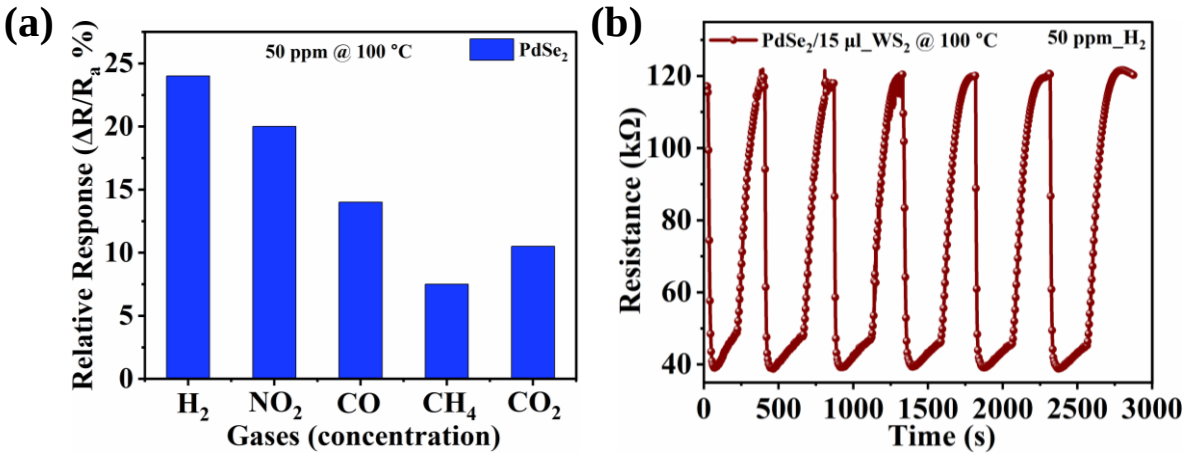

Fig. S4 (a) selectivity of pristine $PdSe_2$ towards various gases (b) repeatability of $PdSe_2/WS_2$ heterostructure.

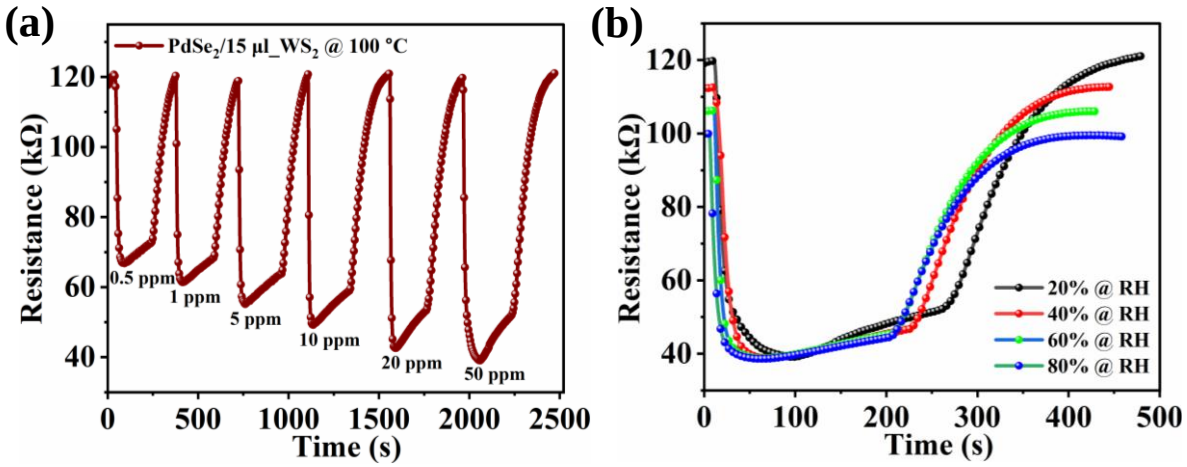

Fig. S5 (a) Resistance of the 15 µl WS_2 anchored $PdSe_2$ sensor at 100 ˚C from 0.5 to 50 ppm H_2 gas. (b) Resistance of the $PdSe_2/WS_2$ heterostructure under different RH condition of 20%, 40%, 60% and 80% to 50 ppm H_2 at 100 ˚C.