## **Supplementary Data for**

## MoSe<sub>2</sub> Nanoflakes Based Chemiresistive Sensors for ppb-level Hydrogen Sulfide gas Detection

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## Liquid Exfoliation of MoSe<sub>2</sub>

We started to exfoliate MoSe<sub>2</sub> in low boiling point solvent like acetone (Boiling point, B.P.=56°C). However, MoSe<sub>2</sub> was unable to exfoliate in it and the powder seems to be settling down at the bottom of polypropylene tube. We further added another common solvent i.e. Isopropyl alcohol (IPA, B.P=82.6°C), ethanol (B.P.=78.37°C), water (B.P.=100°C) etc. in different volume fraction and ultrasonicated for different time duration. It was found that though, pure acetone was not able to exfoliate MoSe<sub>2</sub> but, addition of some amount of IPA was helping in exfoliation. Particularly, MoSe<sub>2</sub> suspended in a binary blend of 90% acetone and 10% of IPA and sonicated for 8 hours shows excellent performance when utilized in gas sensing. Further, we tried blend of ternary solvent and found that further addition of poor solvent as water helped dramatically in reducing number of hours. Quantitatively, bulk MoSe<sub>2</sub> sonicated in a ternary blend of 90% acetone, 5% acetone and 5% water for four hours showed optimal gas sensing performance. This could be due to minimization of exfoliation energy.

Fig. S1 The low-magnification TEM image and corresponding SAED pattern of Bulk MoSe<sub>2</sub> ultrasonicated in ternary solvent (Acetone : IPA: water 90:05:05) for (a & b) 2hrs (c & d) 3 hrs (e & f) 4hrs (g) high-resolution TEM image of edge of a nanoflakes with 5 number of layers of MoSe<sub>2</sub> (h& i) ultrathin layers of MoSe<sub>2</sub> present in the 4hrs sonicated sample and corresponding SAED pattern; The low-magnification TEM image and corresponding SAED pattern of Bulk MoSe<sub>2</sub> ultrasonicated in ternary solvent (Acetone : IPA: water 90:05:05) for (j & k) 5 hrs (l & m) 6 hrs (n & o) 7 hrs; The low-magnification TEM image and corresponding SAED pattern of Bulk MoSe<sub>2</sub> ultrasonicated in binary solvent (Acetone : IPA 90:10) for (p & q) 2hrs (r & s) 4 hrs (t & u) 6 hrs (v & w) 8 hrs (x & y) 10 hrs (z & zz) 12 hrs



5.00 1/m





















Fig. S2. AFM image of MoSe<sub>2</sub> exfoliated in (i) ternary solvent (ii) binary solvent (acetone: IPA 90:10)











Fig. S4. Response at higher concentration after 30 days



Fig. S5. Response for 3500 rpm centrifuged MoSe<sub>2</sub>



Fig. S6. Response for  $MoSe_2$  nanoflakes exfoliated in binary solvent for 5.45 ppm and 50 ppb conc. of  $H_2S$  gas.











