Electronic Supplementary Material (ESI) for RSC Advances

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Supporting Information

Dispersed SnO_2 nanoparticles on MoS_2 nanosheets for superior gas-sensing performances to ethanol

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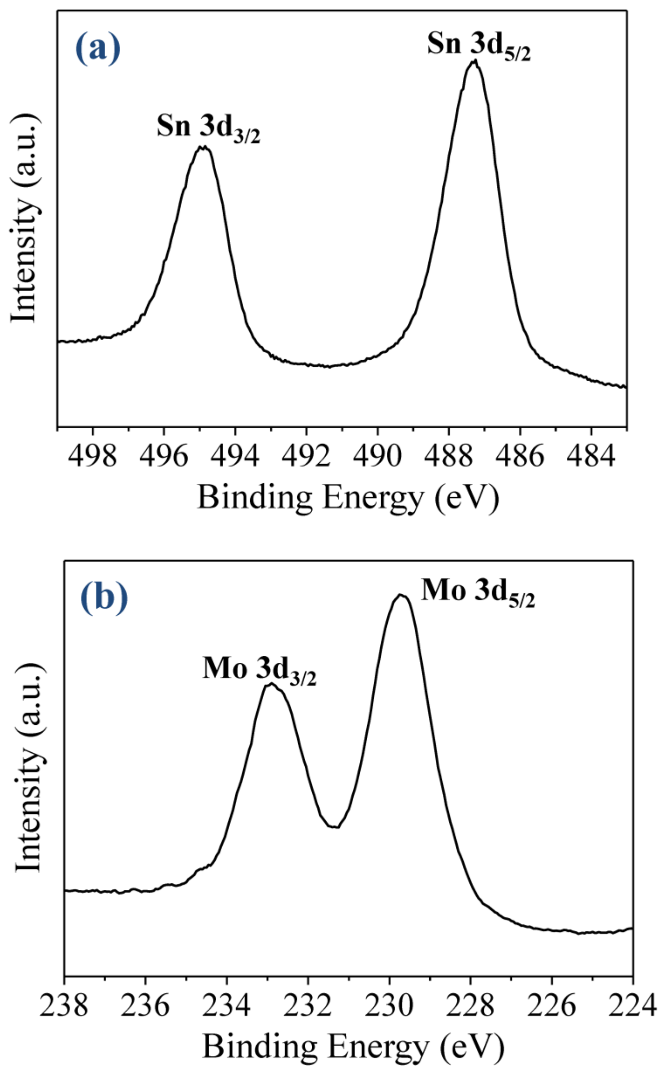
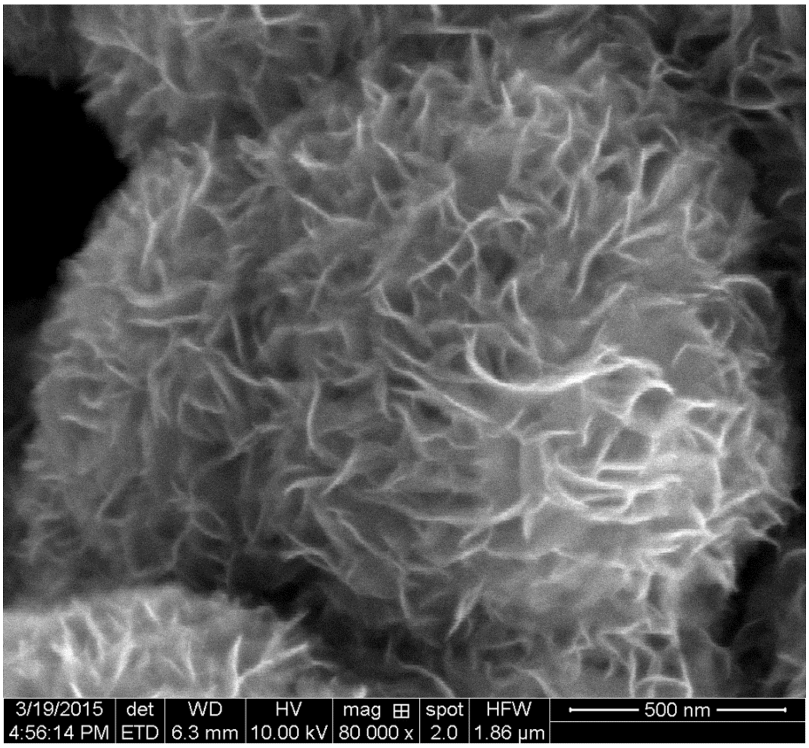


Fig. S1 High resolution XPS spectra of (a) Sn 3d and (b) Mo 3d.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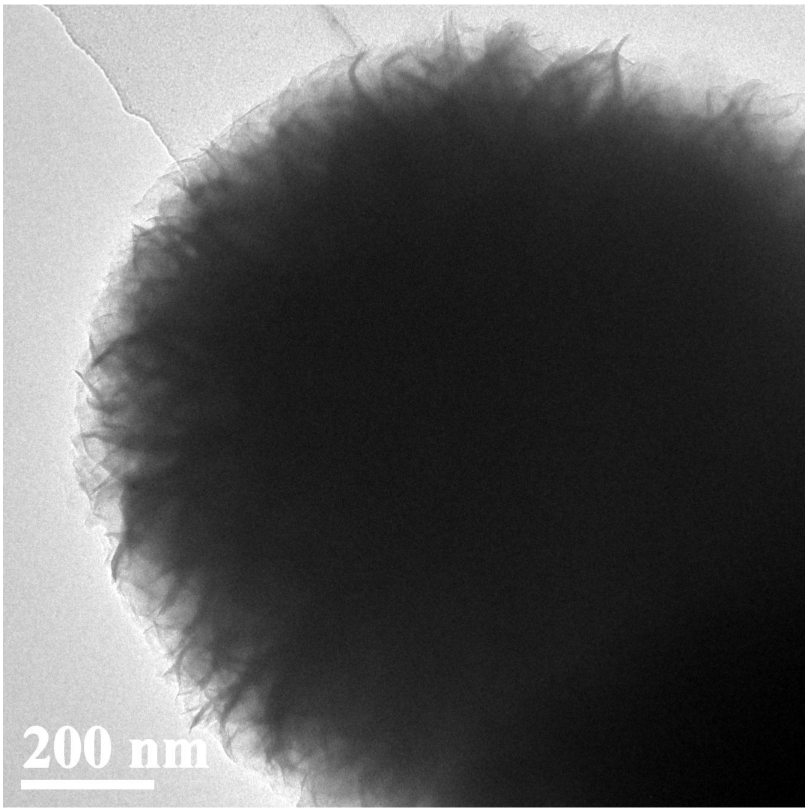
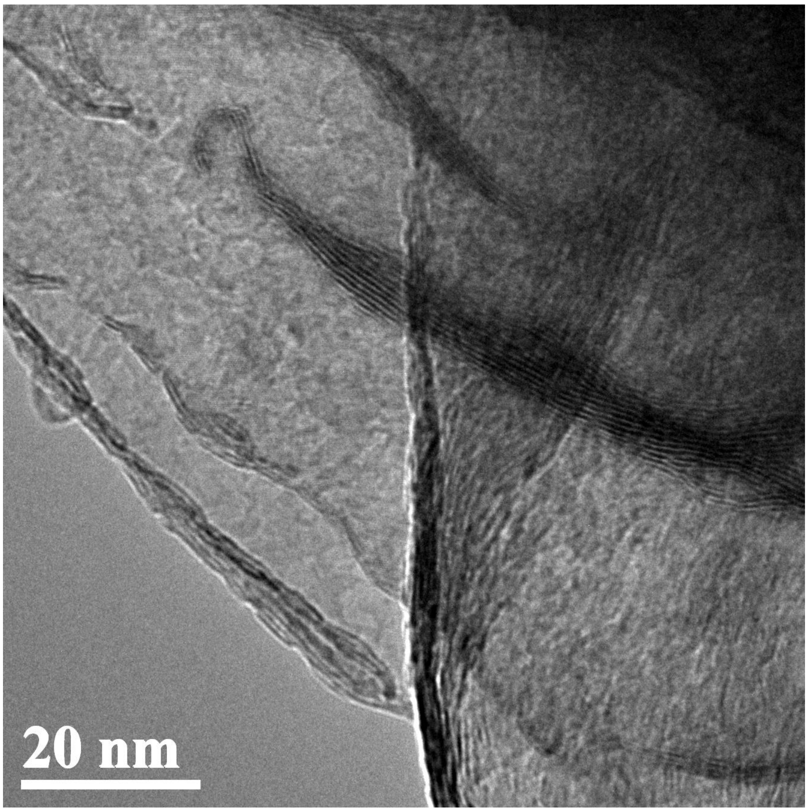
det
ETD
WD
6.3 mm
HV
10.00 kV
mag ⊞
80 000 x
spot
2.0
HFW
1.86 µm
500 nm

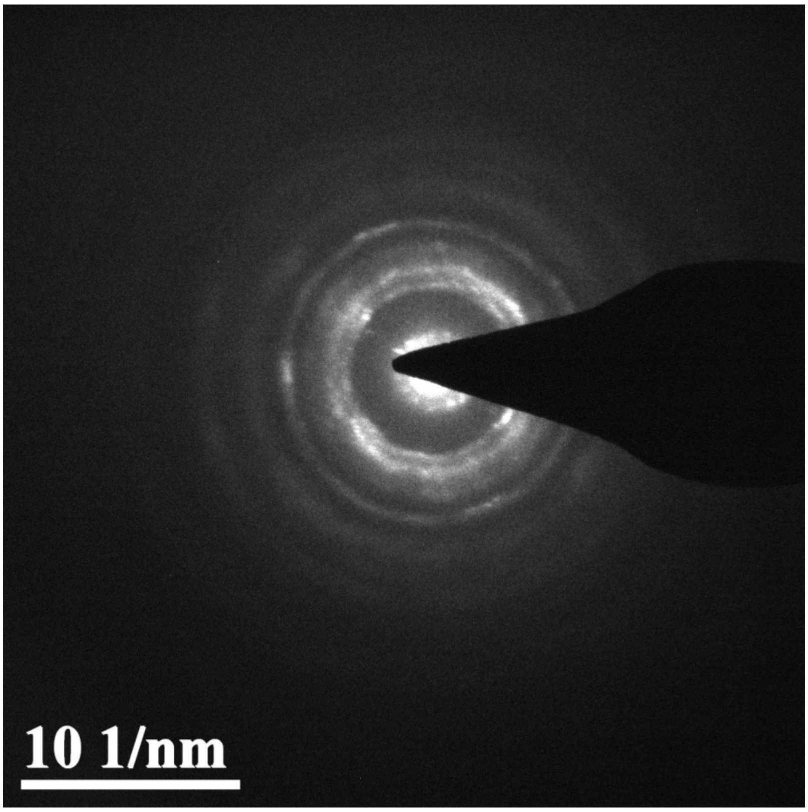
(a)


200 nm

(b)

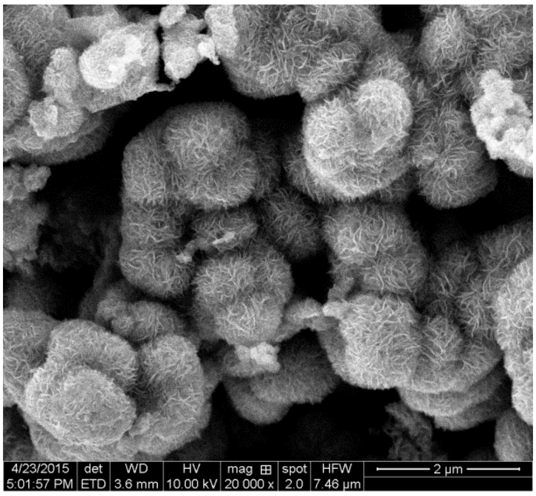


(c)



(d)

Fig. S2 (a) High magnification FESEM image, (b and c) TEM images, and (d) corresponding SAED pattern of as-prepared MoS_2 nanosheets.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WD 3.6 mm
HV 10.00 kV
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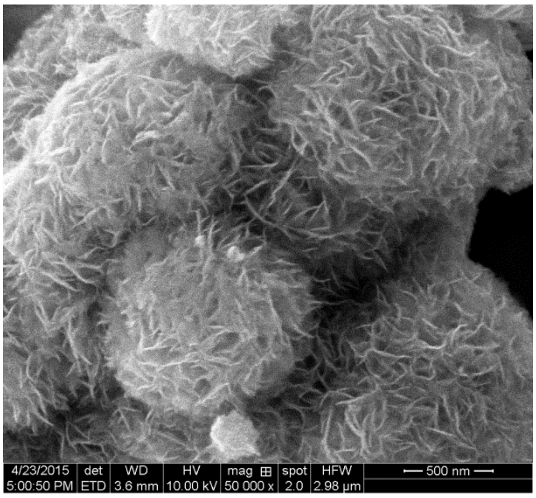
spot 2.0
HFW 7.46 μm
2 μm

(a)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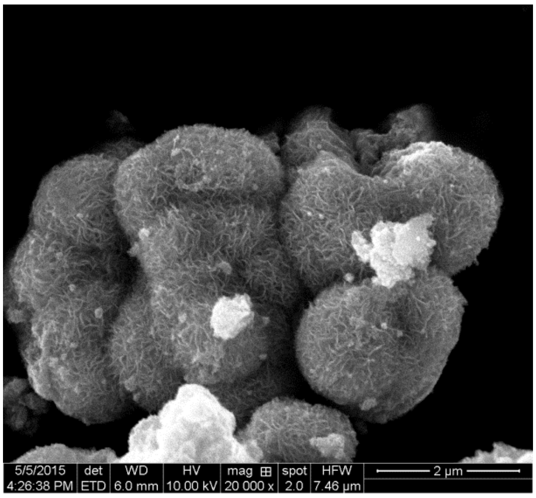
(b)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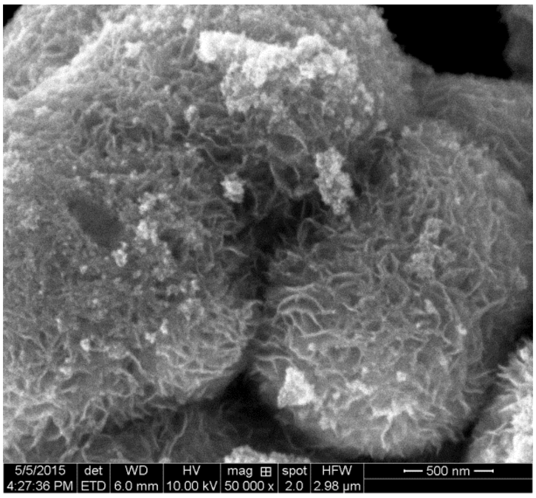
HFW 7.46 μm
2 μm

(c)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spot 2.0
HFW 2.98 μm
500 nm

(d)


4/11/2015 9:22:57 PM
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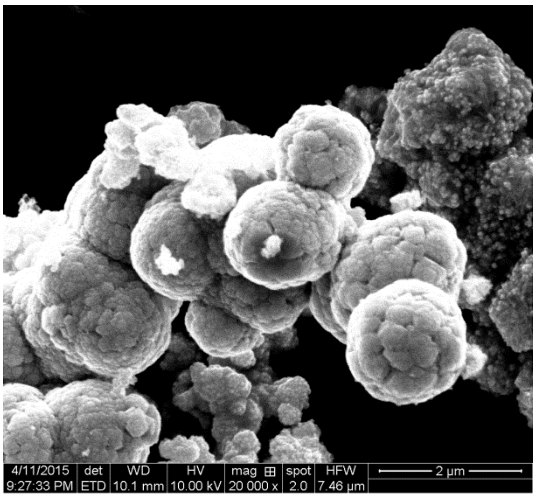
spot 2.0
HFW 29.8 μm
5 μm

(e)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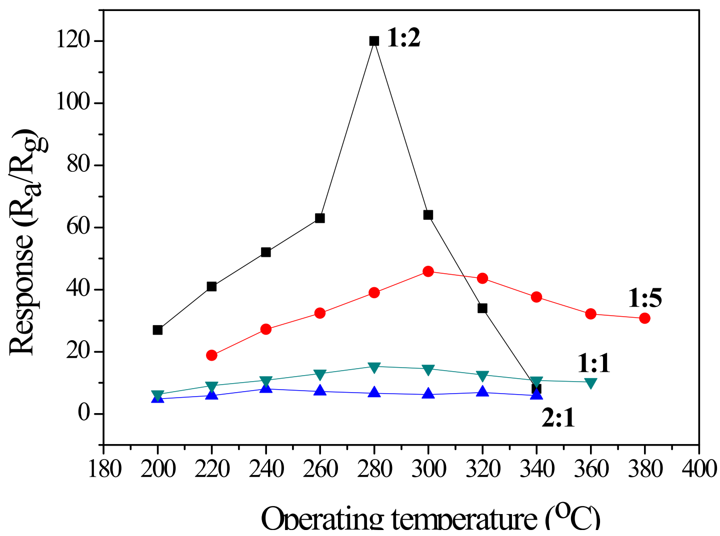
HFW 7.46 μm
2 μm

(f)



(g)

Fig. S3 FESEM images and gas response of SnO_2@MoS_2 composites at different molar ratio.

MoS_2:SnO_2 = 2:1 (a and b), 1:1 (c and d) and 1:5 (e and f).

To reveal the influence of the content of SnO_2 in composites, the study of morphology and gas response of SnO_2@MoS_2 composites with different reaction conditions was investigated by changing the MoS_2/SnO_2 molar ratios, while temperature and reaction time were kept at 200 ^{o}C and 21 h, respectively. As shown in Fig. S3, with the increase in the molar ratio from 2:1 to 1:1, an increased amount of SnO_2 can be observed on the surface of MoS_2 nanoflowers. When the molar ratio is 1:5, the MoS_2 nanoflowers are almost all covered with SnO_2. As seen in Fig.S3 (g), only few SnO_2 nanoparticles can be observed with the lower molar ratio. In addition, a higher molar ratio can induct the MoS_2 almost all covered with SnO_2, leading to the decrease of specific surface area and the loss of the supporting substrate for dispersing SnO_2. As a result, the composites with the MoS_2/SnO_2 molar ratios of 1:2 exhibit the optimum gas sensing performance.