Ultrathin Tungsten Oxide Nanowires/Reduced Graphene Oxide Composites for Toluene Sensing

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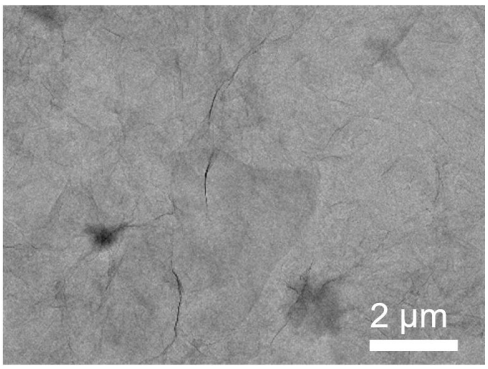

Figure S1 TEM image of GO.

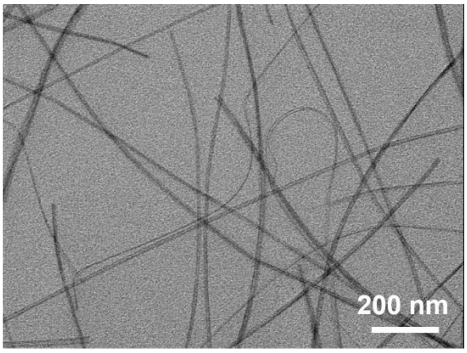

Figure S2 TEM image of $W_{18}O_{49}$ NWs.

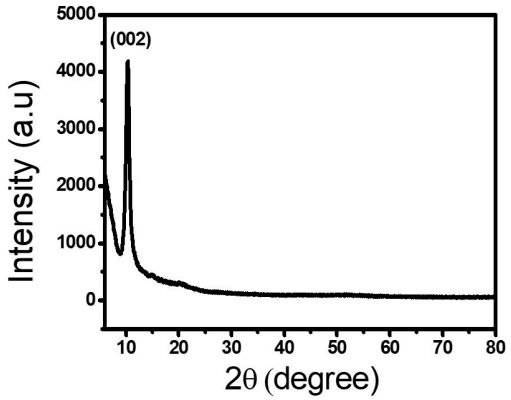

Figure S3 XRD spectra of GO.

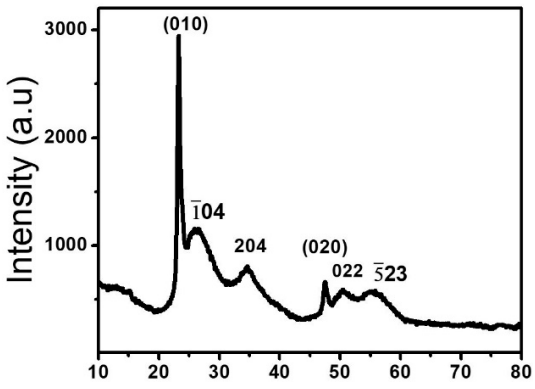

Figure S4 XRD spectra of $W_{18}O_{49}$ NWs.

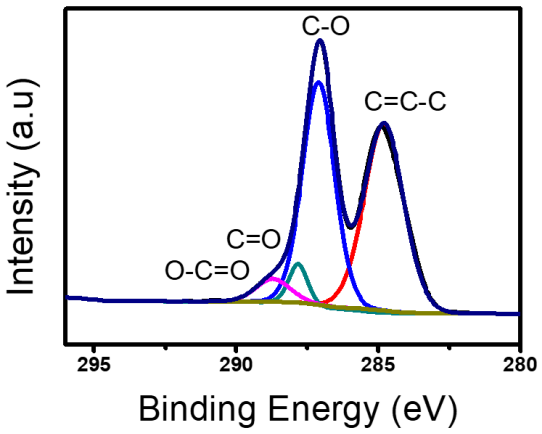

Figure S5 XPS spectra of GO.

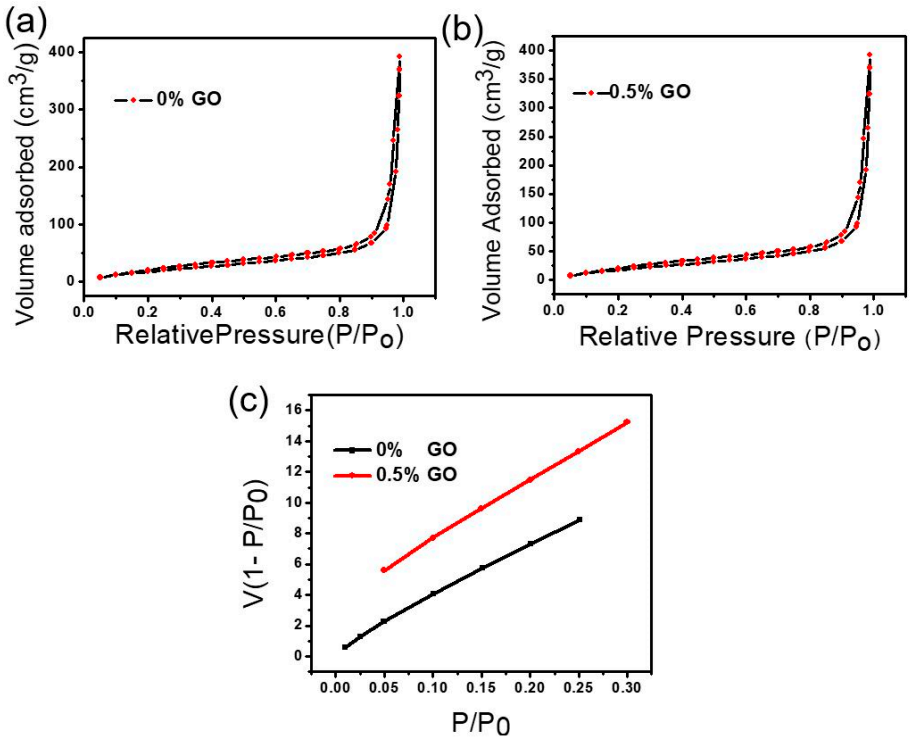

Figure S6 (a, b)Nitrogen adsorption-desorption isotherm curves of $W_{18}O_{49}$ NWs and 0.5wt% $W_{18}O_{49}$ NWs/rGO composite, (c) linear form BET isotherm of Pure $W_{18}O_{49}$ NW and 0.5wt% $W_{18}O_{49}$ NWs/rGO composite.

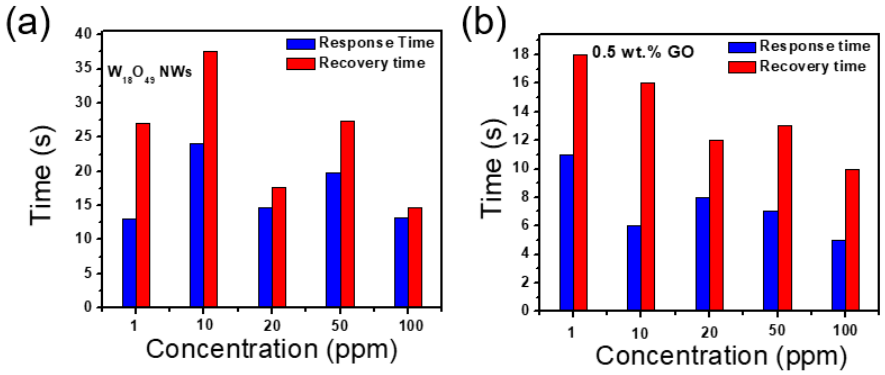

Figure S7. Response and recovery time sensor based on (a) $W_{18}O_{49}$ NWs and (b) 0.5 wt% $W_{18}O_{49}$ NWs/rGO composite to different concentrations of toluene vapor at 300 ˚C.

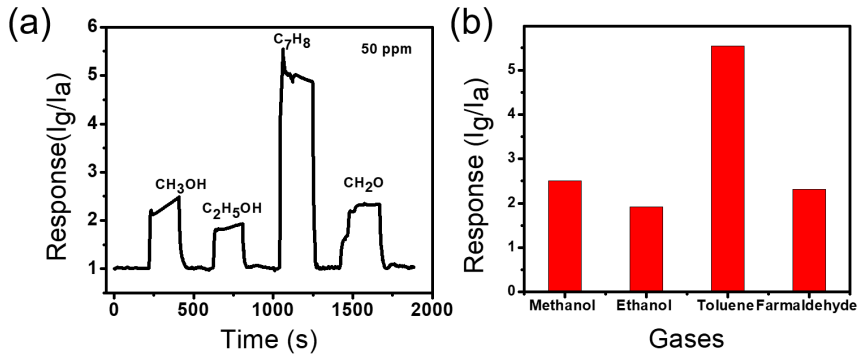

Figure S8 Gas sensing response of 0.5 wt.% $W_{18}O_{49}$ NWs/rGO composite towards 50 ppm methanol, ethanol, toluene and farmaldehyde gases.