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Supplementary information:

Facet-Engineered CeO_2/Graphene Composites for Enhanced NO_2 Gas-Sensing

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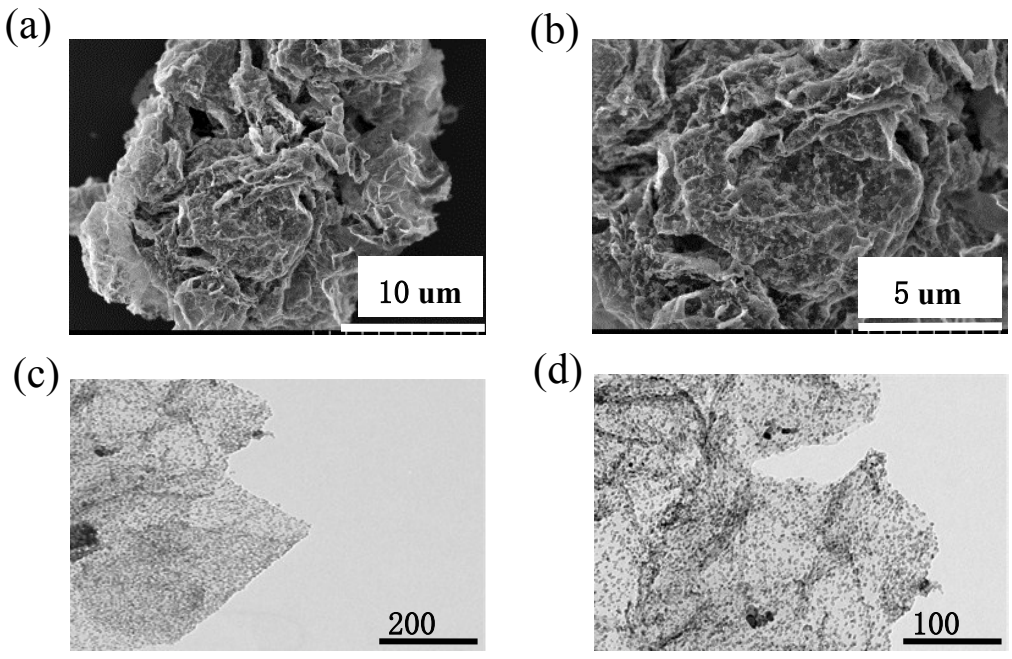

Figure S1. The SEM and TEM images of CeO_2/Graphene composites prepared with EG/H_2O volume ratios of 0:40. (a, b: SEM images, c, d: TEM images)

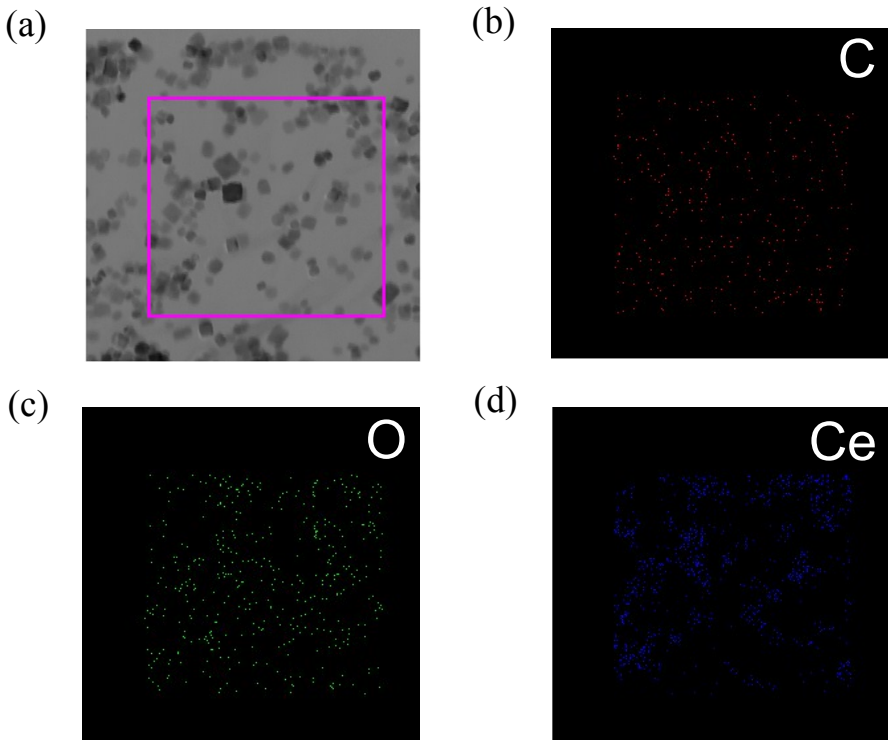

Figure S2. Elemental maps of the CeO_2/graphene nanocomposite.

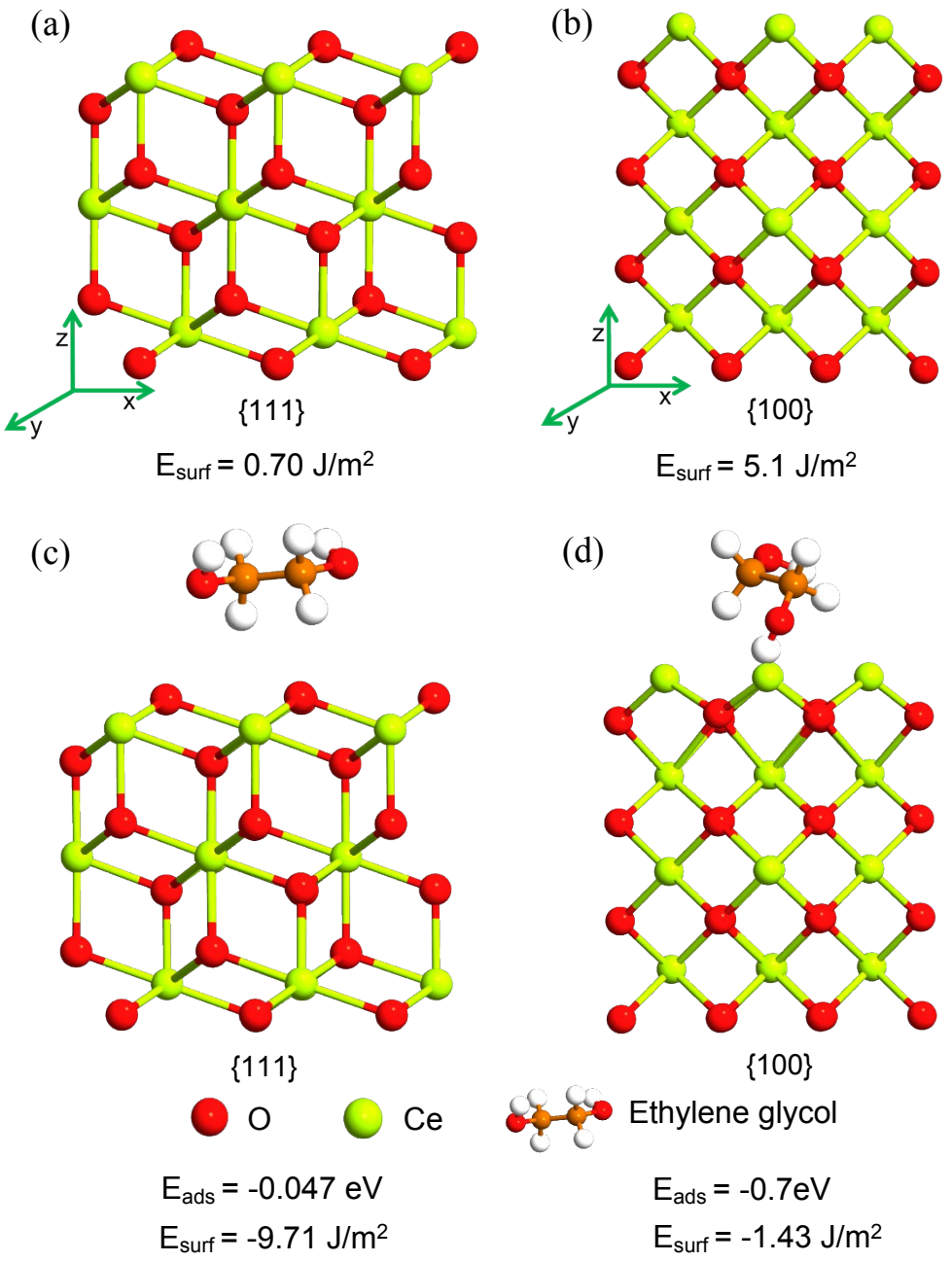

Figure S3. Calculated surface energy of the CeO_2 {111} and {100} planes as well as adsorption energy of ethylene glycol: (a, b) Clean surface; (c, d) Ethylene glycol-covered surface (E_{surf} =surface energy and E_{ads} =absorption energy).

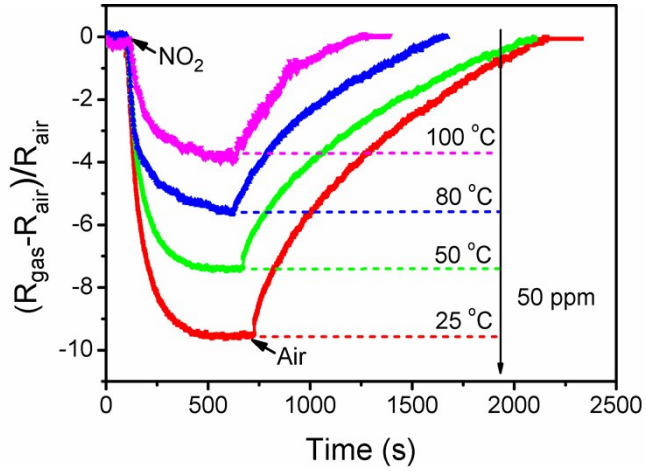

Figure S4. The response curves to 50 ppm NO_2 of CeO_2/Graphene composites prepared with EG/H_2O volume ratios of 0:40 at operating temperature of 25℃, 50℃, 80℃ and 100℃.

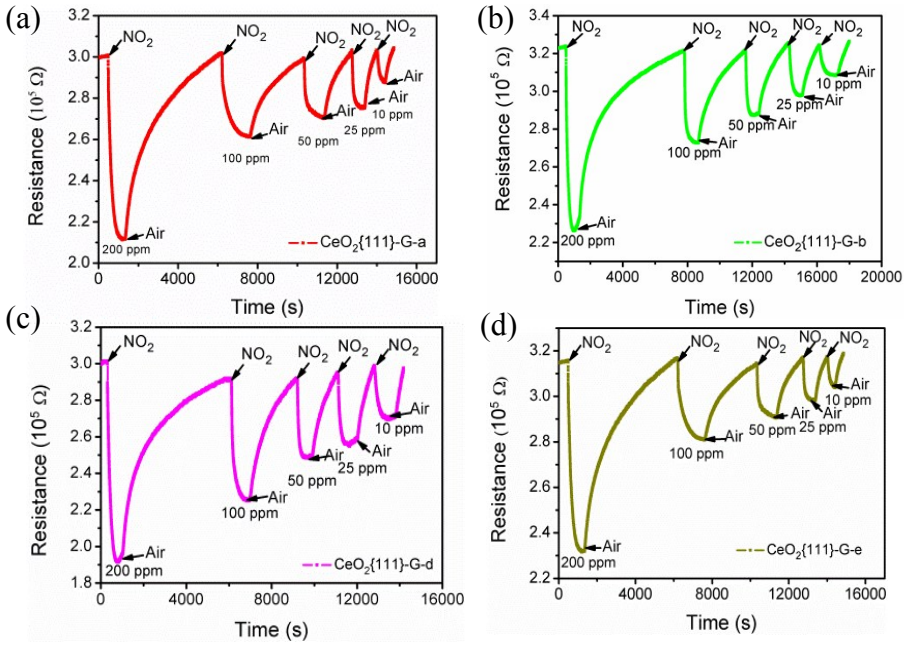

Figure S5. Response and recovery curves of CeO_2{111}/graphene composites prepared with different EG/H_2O volume ratios: (a) 0:40, (b) 10:30, (d) 30:10, and (e) 40:0. The concentration of NO_2 adopted is in the range of 10-200 ppm, and the measurements are done at room temperature.

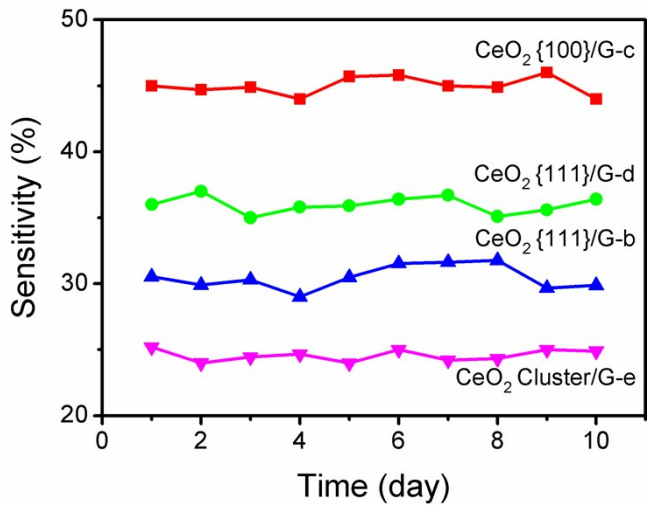

Figure S6. The sensitivity of the CeO_2/Graphene composites to 200 ppm NO_2 measured every days. (b: EG/H_2O=10:30, c: EG/H_2O=20:20, d:EG/H_2O=30:10, and e: EG/H_2O=40:0)

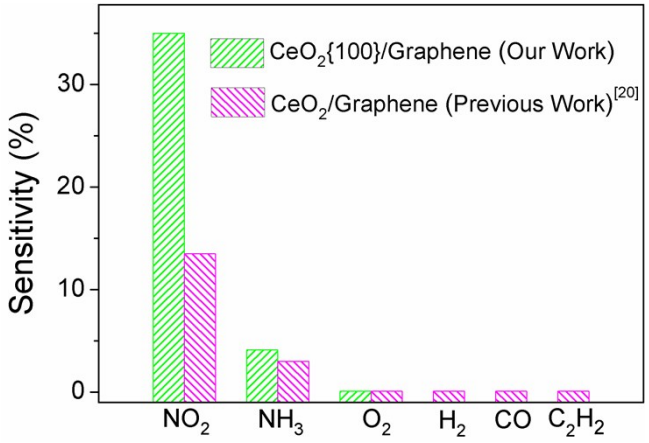

Figure S7. The response of CeO_2/Graphene sensor to 100 ppm several possible interferential gases. (Magenta: The previous work[20], Green: Our work)

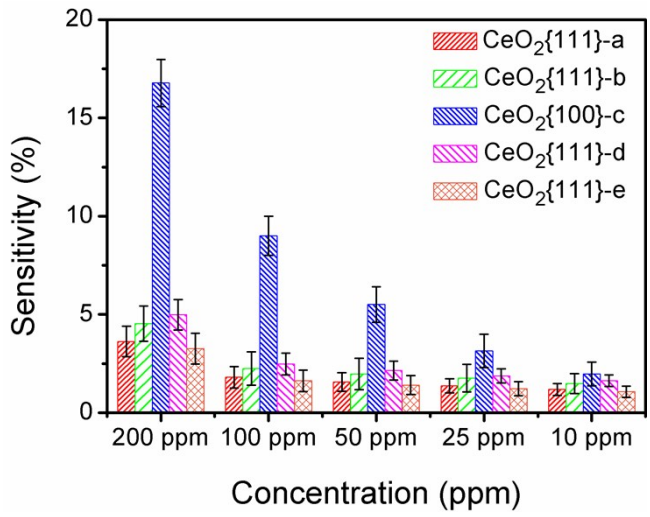

Figure S8. Sensitivity of the pure CeO_2 nanoparticles prepared with different volume ratios of the EG/H_2O for 10-200 ppm NO_2 at room temperature.(a: 0:40, b: 10:30, c: 20:20, d: 30:10, and e: 40:0).

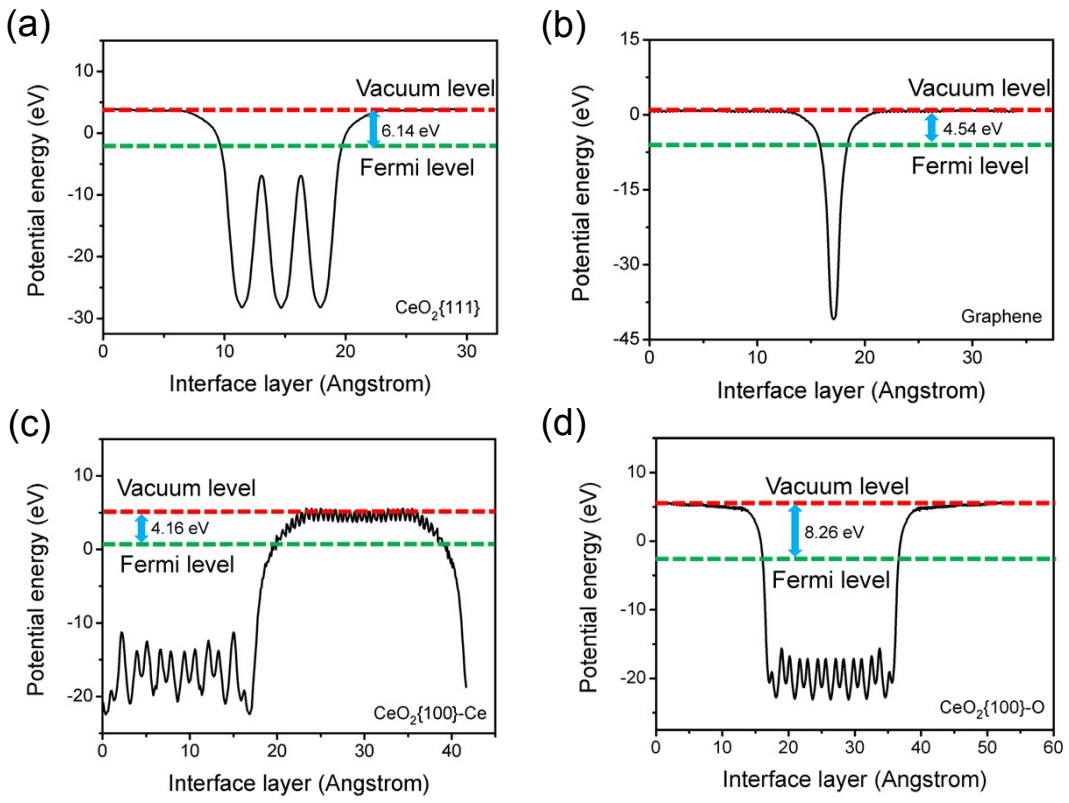

Figure S9. Work function of the (a) CeO_2{111} plane; (b) graphene; (c) CeO_2{100} plane terminated with Ce; (d) CeO_2{100} plane terminated with O.

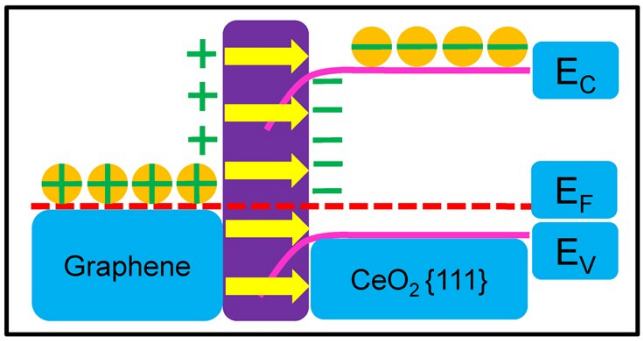

Figure S10. Energy band configurations of CeO_2{111}/graphene composites.(E_C: Conduction band, E_V: Valence band, and E_F: Fermi level)

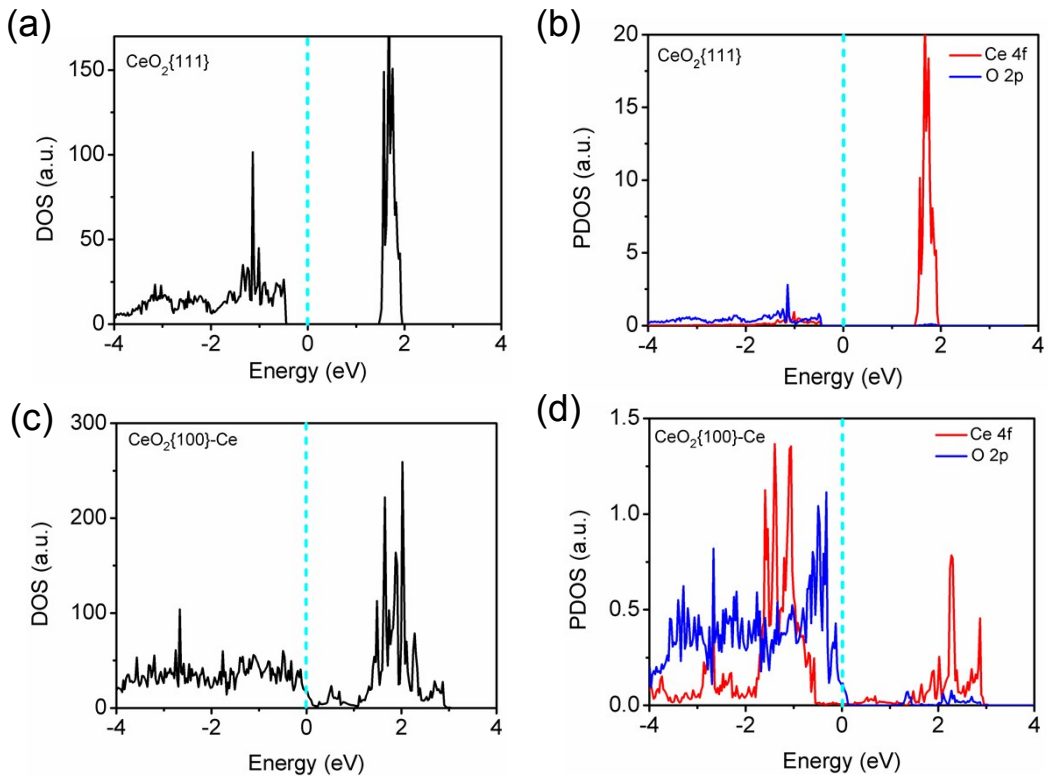

Figure S11. The DOS and PDOS of (a, b) the CeO_2 {111} plane, (c, d) the {100}-Ce plane，respectively. The dashed lines indicate the Fermi level.