

Supplementary Information

**Hollow spheres of $\text{CoCr}_2\text{O}_4\text{-Cr}_2\text{O}_3$ mixed oxides
with nanoscale heterojunctions for exclusive detection of indoor xylene**

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SUPPLEMENTARY FIGURES

Figure S1

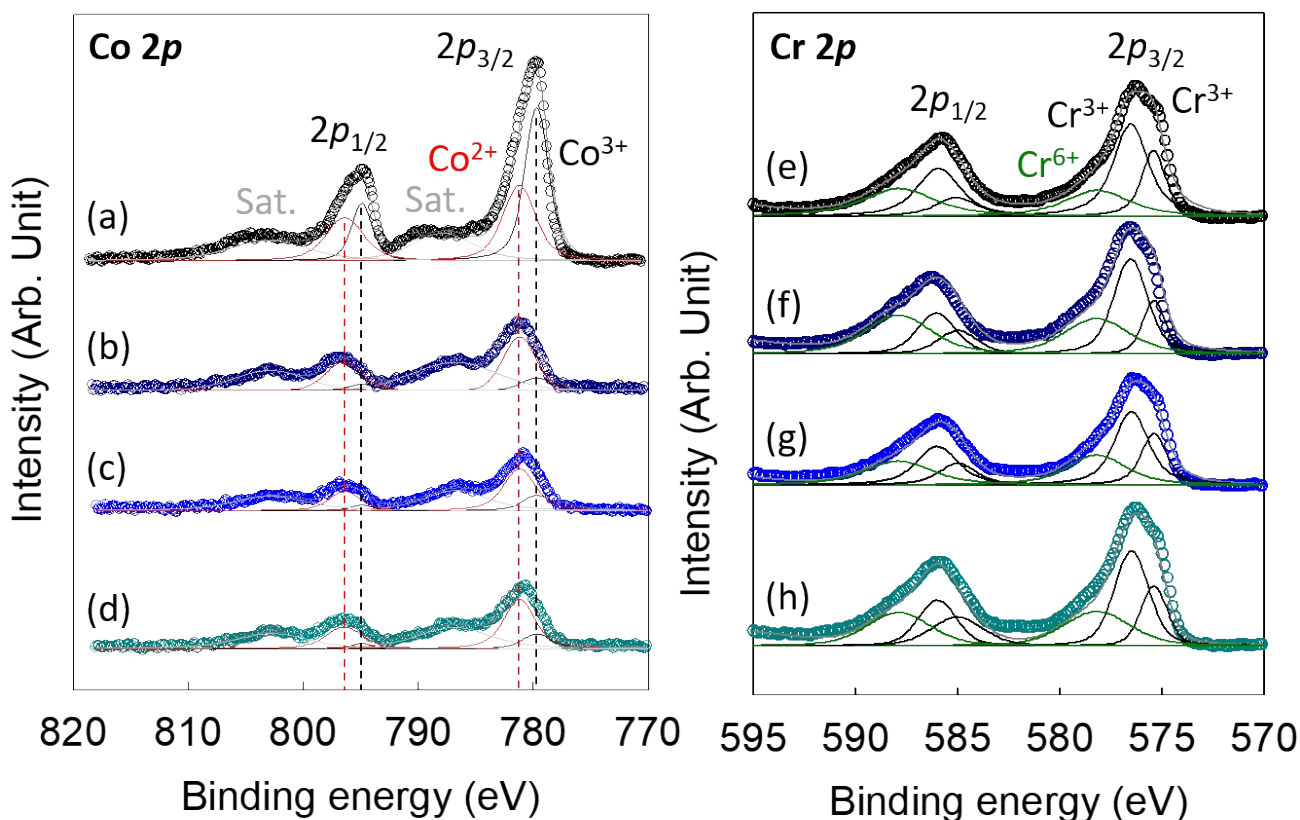


Figure S1 XPS spectra for (a-d) Co 2p and (e-h) Cr 2p: (a) pure Co_3O_4 , (b, f) Co_1Cr_2 , (c, g) Co_1Cr_3 , (d, h) Co_1Cr_4 , and (e) Cr_2O_3 .

Figure S2

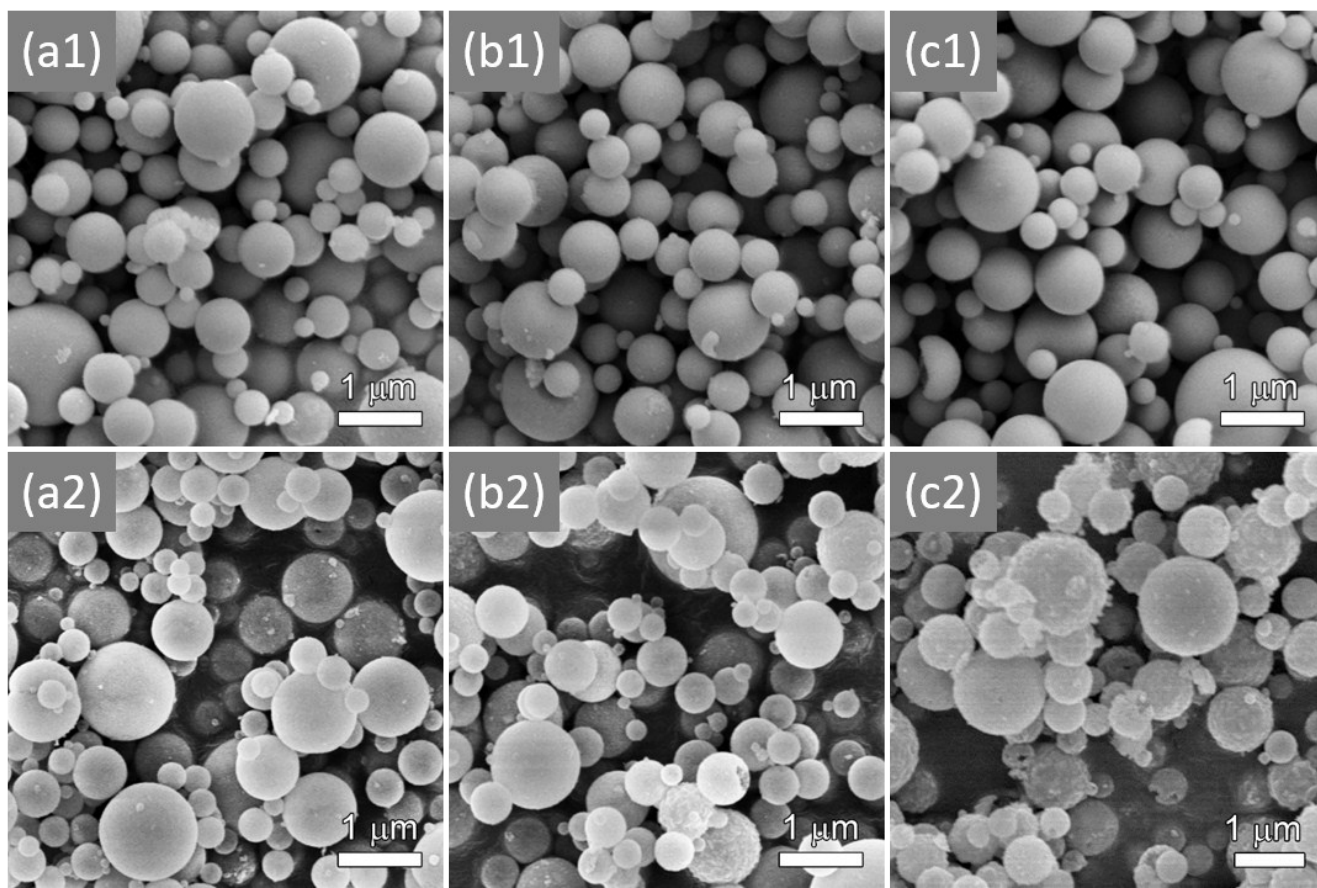


Figure S2 SEM images for (a1, a2) Co1Cr2, (b1, b2) Co1Cr3, and (c1, c2) Co1Cr4 spheres (a1-c1) before and (a2-c2) after heat-treatment at 700 °C for 2 h.

Figure S3

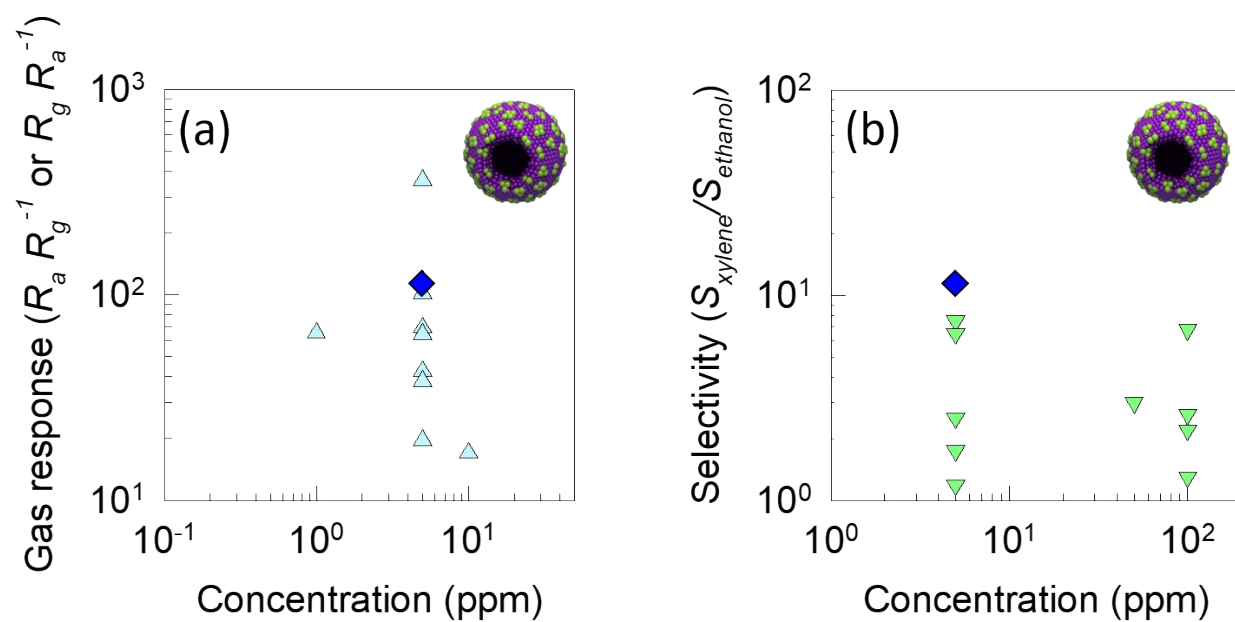


Figure S3 (a) Xylene response of Co₁Cr₃ sensor compared to the reported values in the literature.¹⁻⁹ (b) Xylene selectivity of the sensor compared to that of pure Co₃O₄ nanostructures in the literature.^{5,10-18}

Figure S4

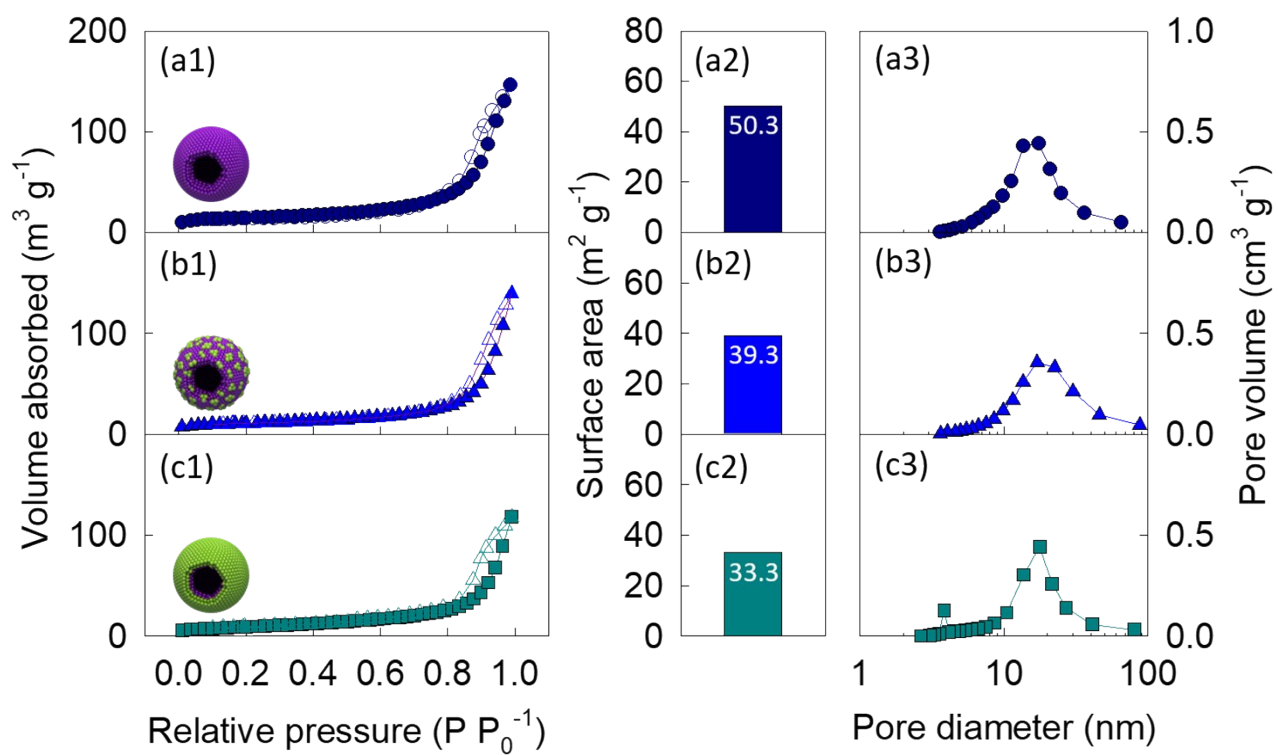


Figure S4. (a1-c1) N₂ adsorption and desorption isotherms, (a2-c2) BET surface areas, and (a3-c3) pore size distributions for (a) Co₁Cr₂, (b) Co₁Cr₃, and (c) Co₁Cr₄ spheres.

Figure S5

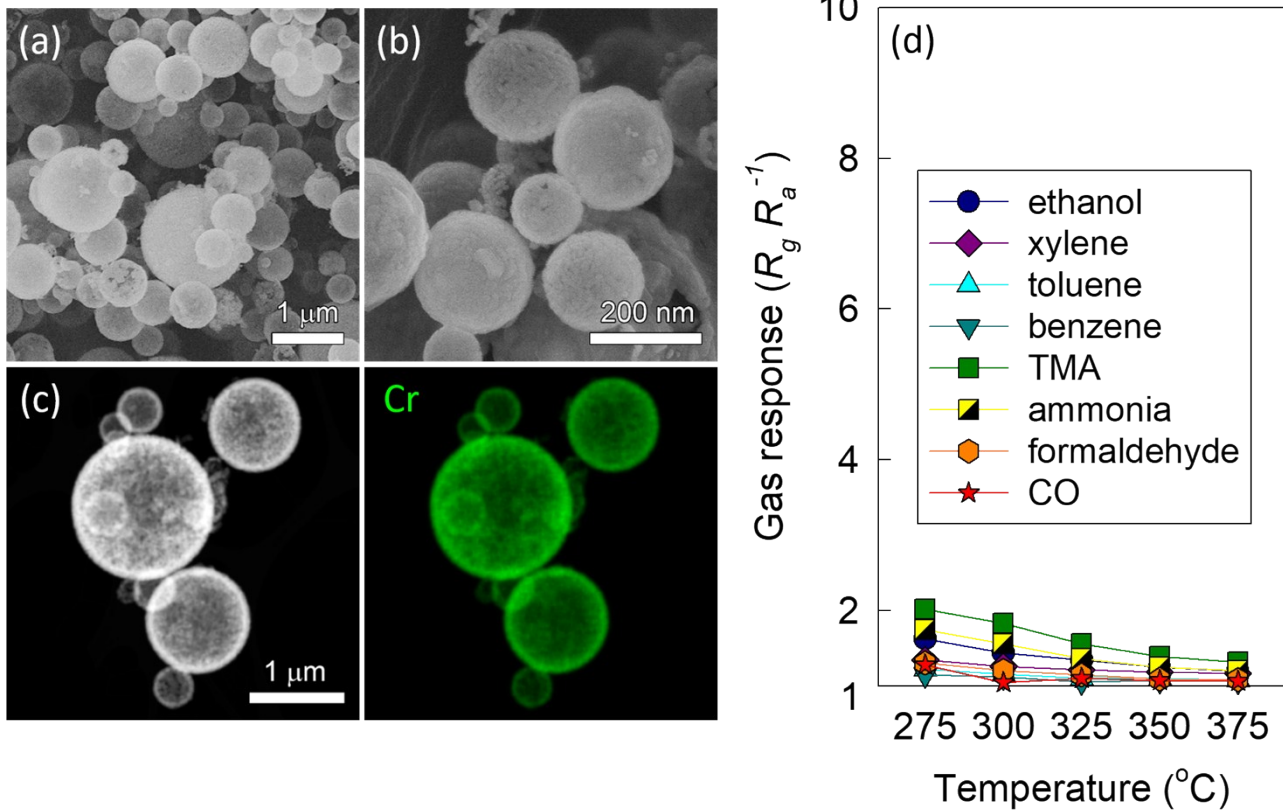


Figure S5. (a, b) SEM and (c) STEM images of pure Cr_2O_3 spheres. (d) Gas responses of the sensor to 5 ppm ethanol, xylene, toluene, benzene, trimethylamine, ammonia, formaldehyde, and carbon monoxide at the same temperature.

Figure S6

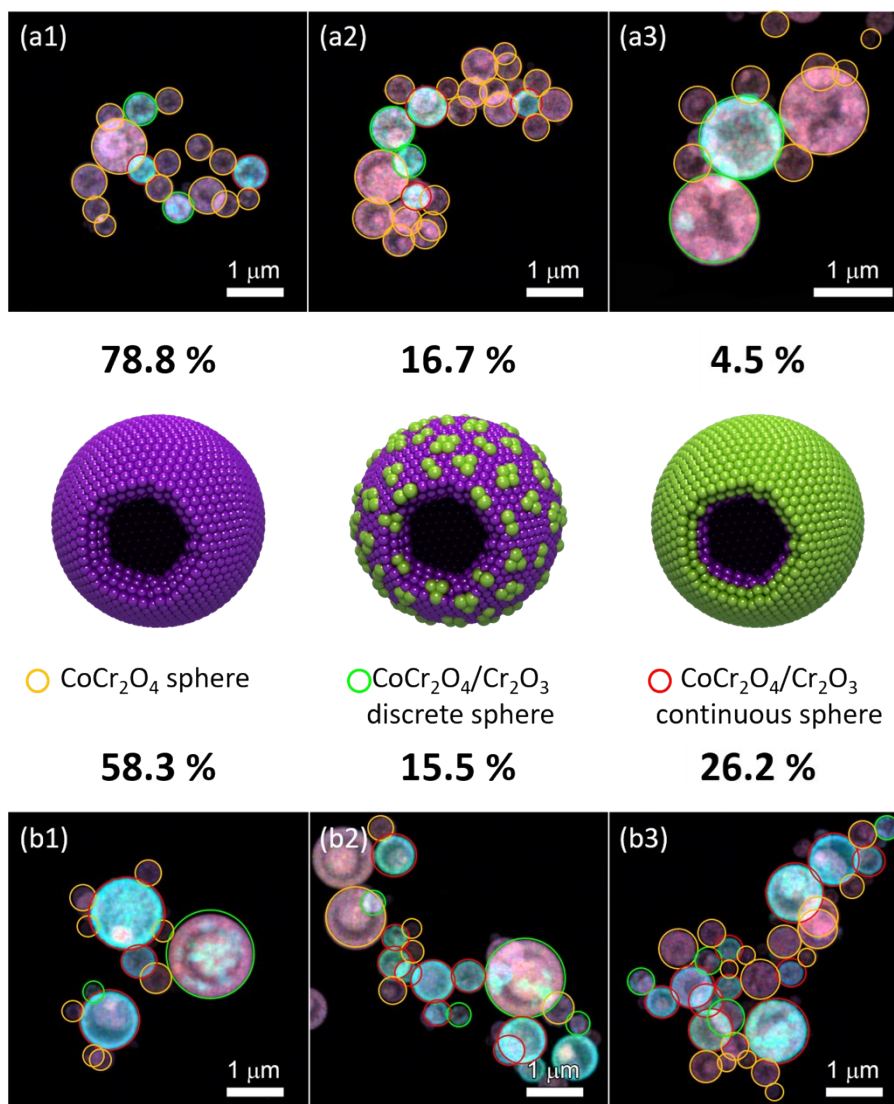


Figure S6. Results of the statistical analysis using the elemental mapping images for (a) Co1Cr3 and (b) Co1Cr4 spheres.

Figure S7

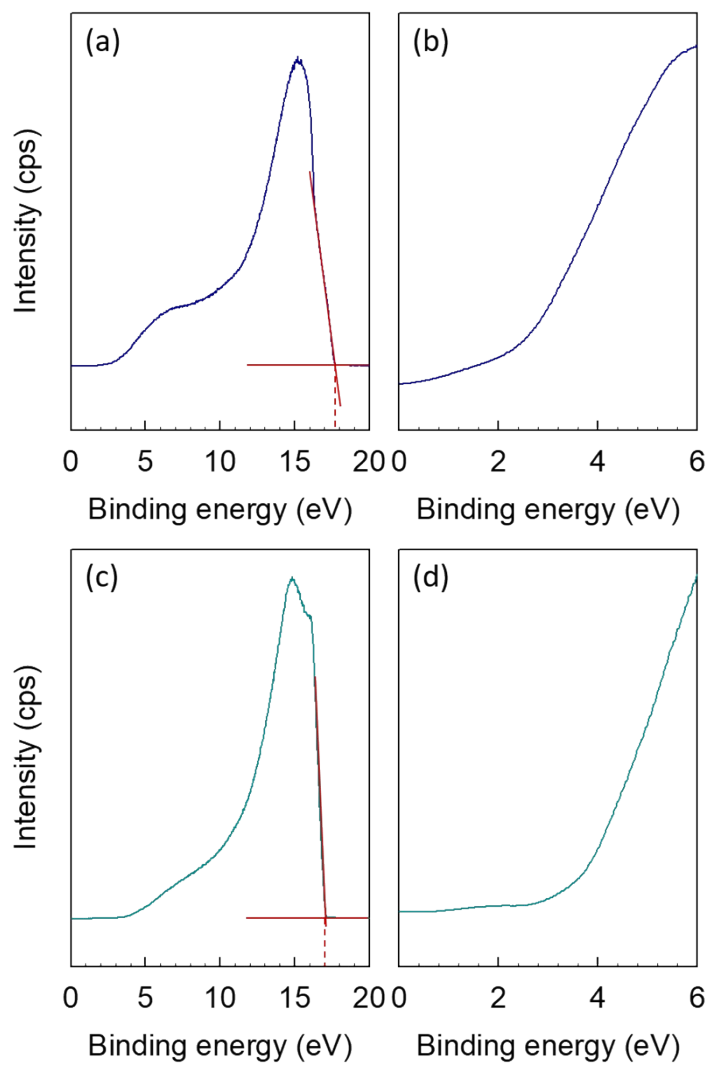


Figure S7. The UPS spectra for (a, b) CoCr₂O₄ and (c, d) Cr₂O₃.

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