

Supplementary Information

Organosulfur Adsorbents by Self-Assembly of Titania Based Ternary Metal Oxide Nanofibers

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Figure S1. From left to right: $\text{CuO}/\text{La}_2\text{O}_3/\text{TiO}_2$, $\text{Ag}_2\text{O}/\text{La}_2\text{O}_3/\text{TiO}_2$ and $\text{Au}/\text{La}_2\text{O}_3/\text{TiO}_2$ after calcination at 500°C for two hrs.

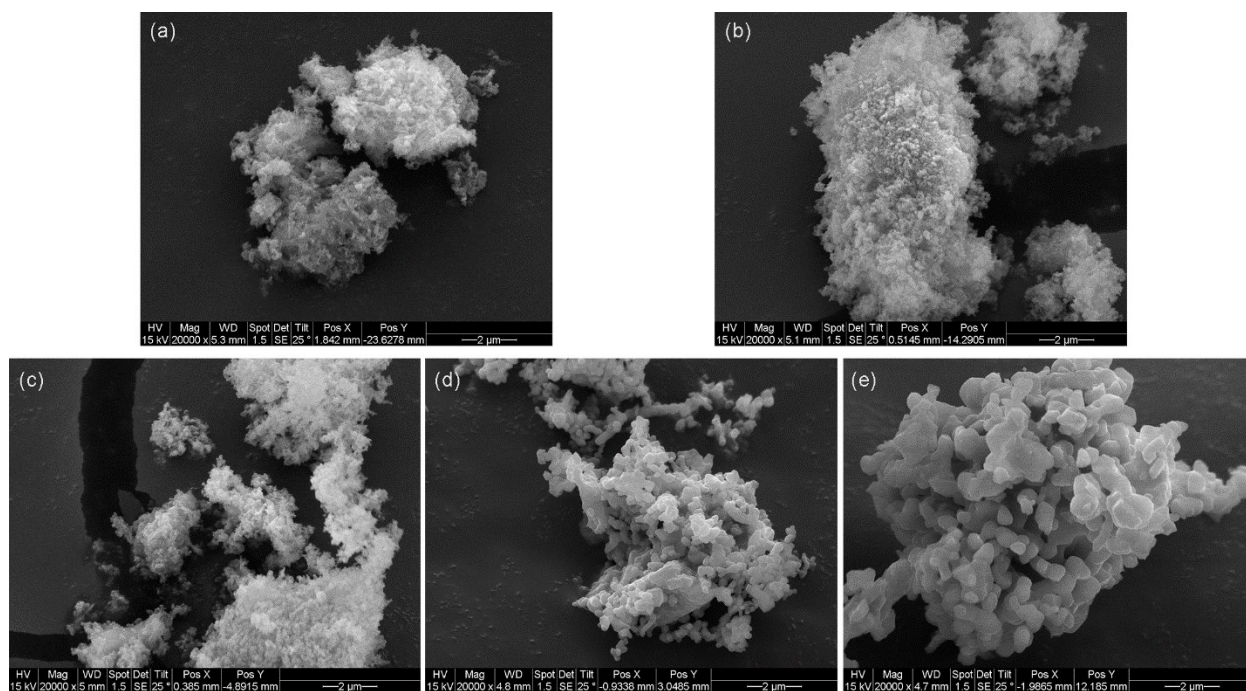


Figure S2. SEM images of $\text{CuO}/\text{La}_2\text{O}_3/\text{TiO}_2$ calcined at 600 (a), 700 (b), 800 (c), 900 (d), and 1000 °C (e).

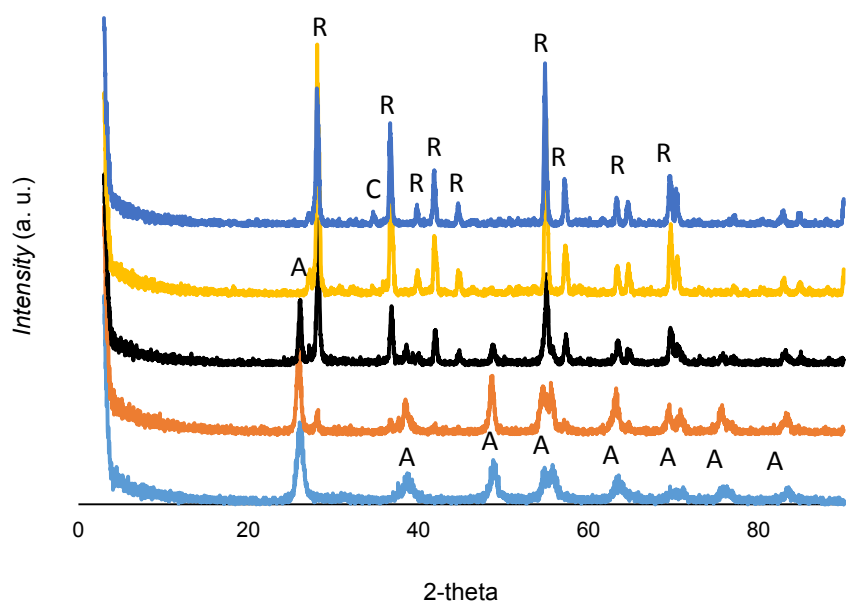


Figure S3. XRD patterns of CuO/La₂O₃/TiO₂ calcined at 600 °C (baby blue), 700 °C (orange), 800 °C (black), 900 °C (yellow), and 1000 °C (blue).

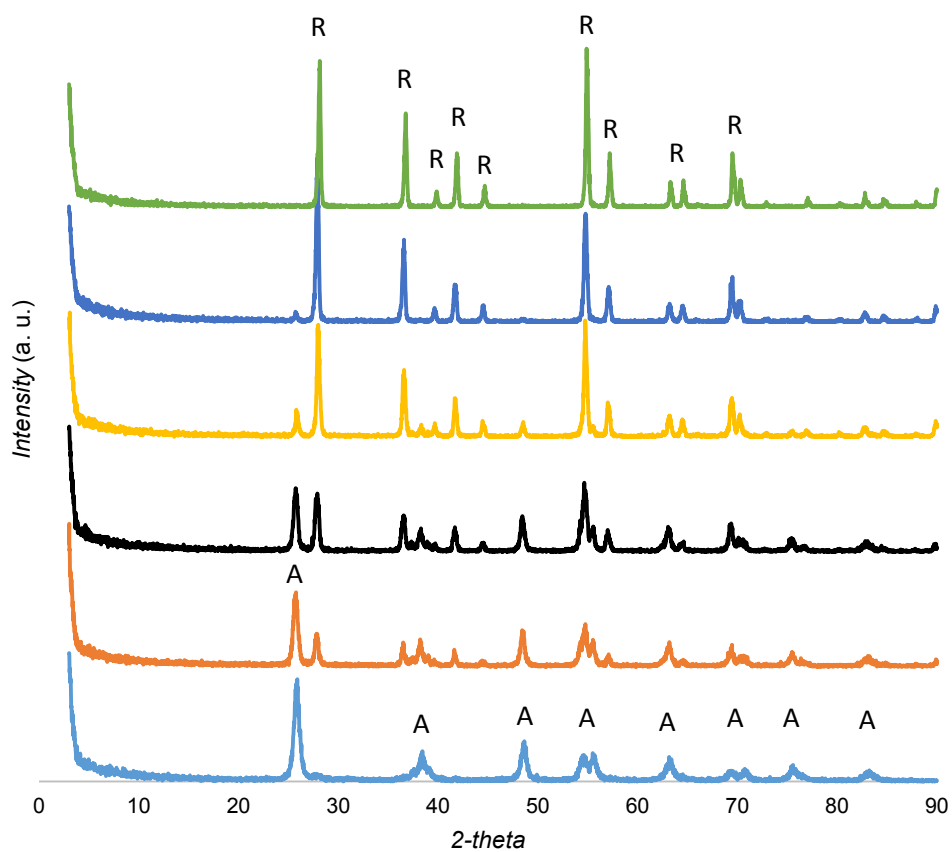


Figure S4. XRD patterns of TiO₂ nanofibers calcined at 500 °C (baby blue), 600 °C (orange), 700 °C (black), 800 °C (yellow), 900 °C (blue), and 1000 °C (green).

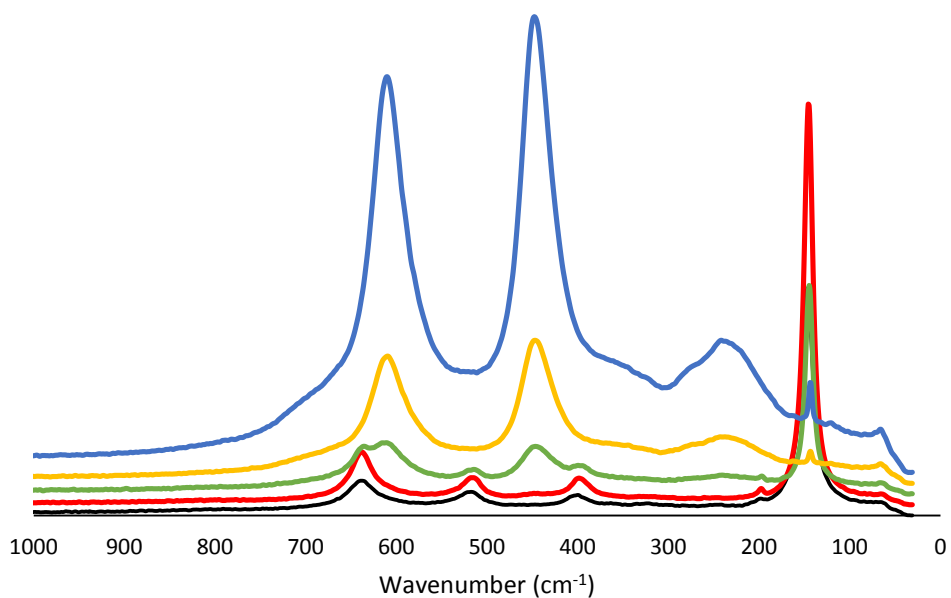


Figure S5. Raman spectra of the CuO/La₂O₃/TiO₂ calcined at 600 °C (black), 700 °C (red), 800 °C (green), 900 °C (yellow), and 1000 °C (blue). Only anatase and rutile peaks can be observed.

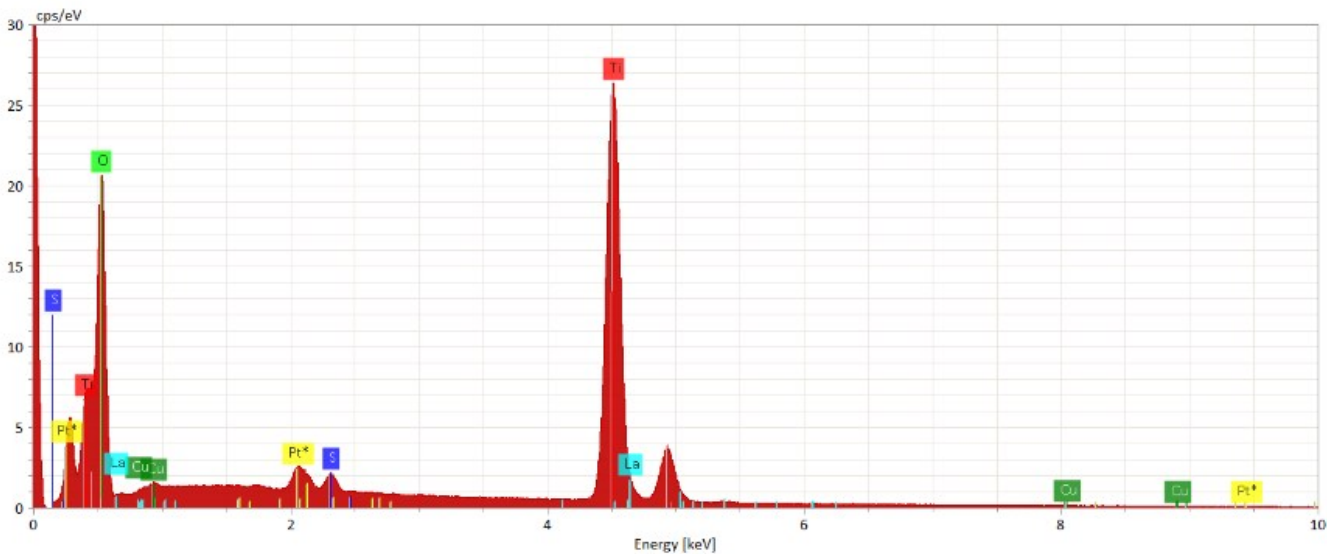


Figure S6. EDS spectrum of CuO/La₂O₃/TiO₂ that was used for thiol adsorption.

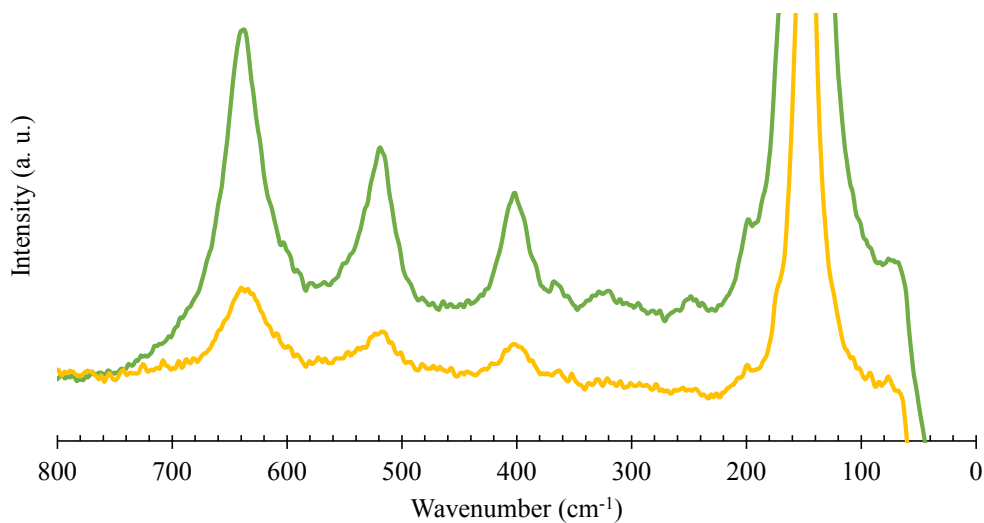


Figure S7. Raman spectra of the fresh (green) and used (yellow) CuO/La₂O₃/TiO₂ collected using the same parameters. The anatase peak intensities from the used adsorbent are lower than those from the fresh counterpart; a result of the surface covered with the adsorbate molecules.

CuO-La₂O₃-TiO₂

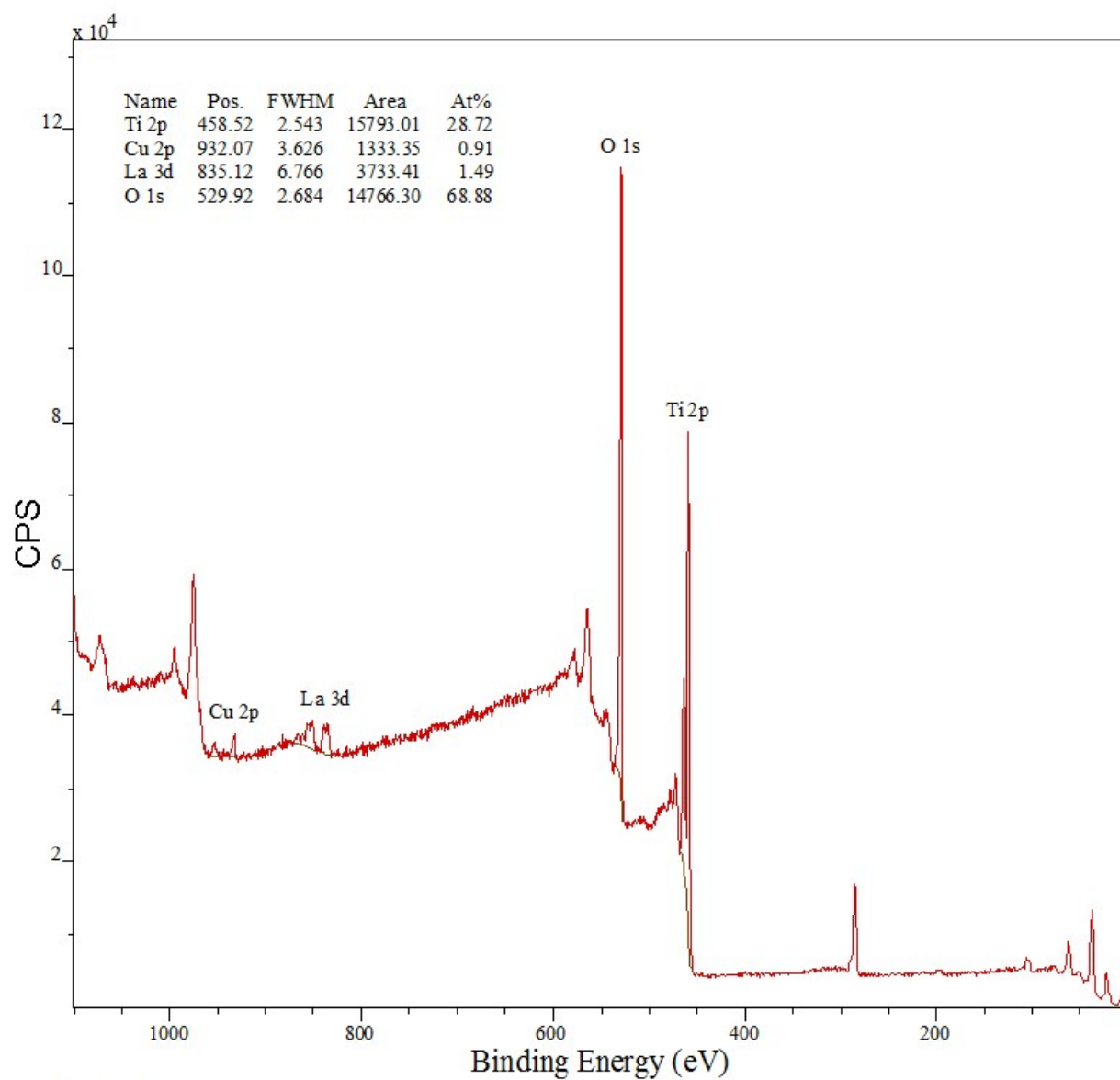


Figure S8. XPS scan of the CuO/La₂O₃/TiO₂ sample.

Ag₂O-La₂O₃-TiO₂

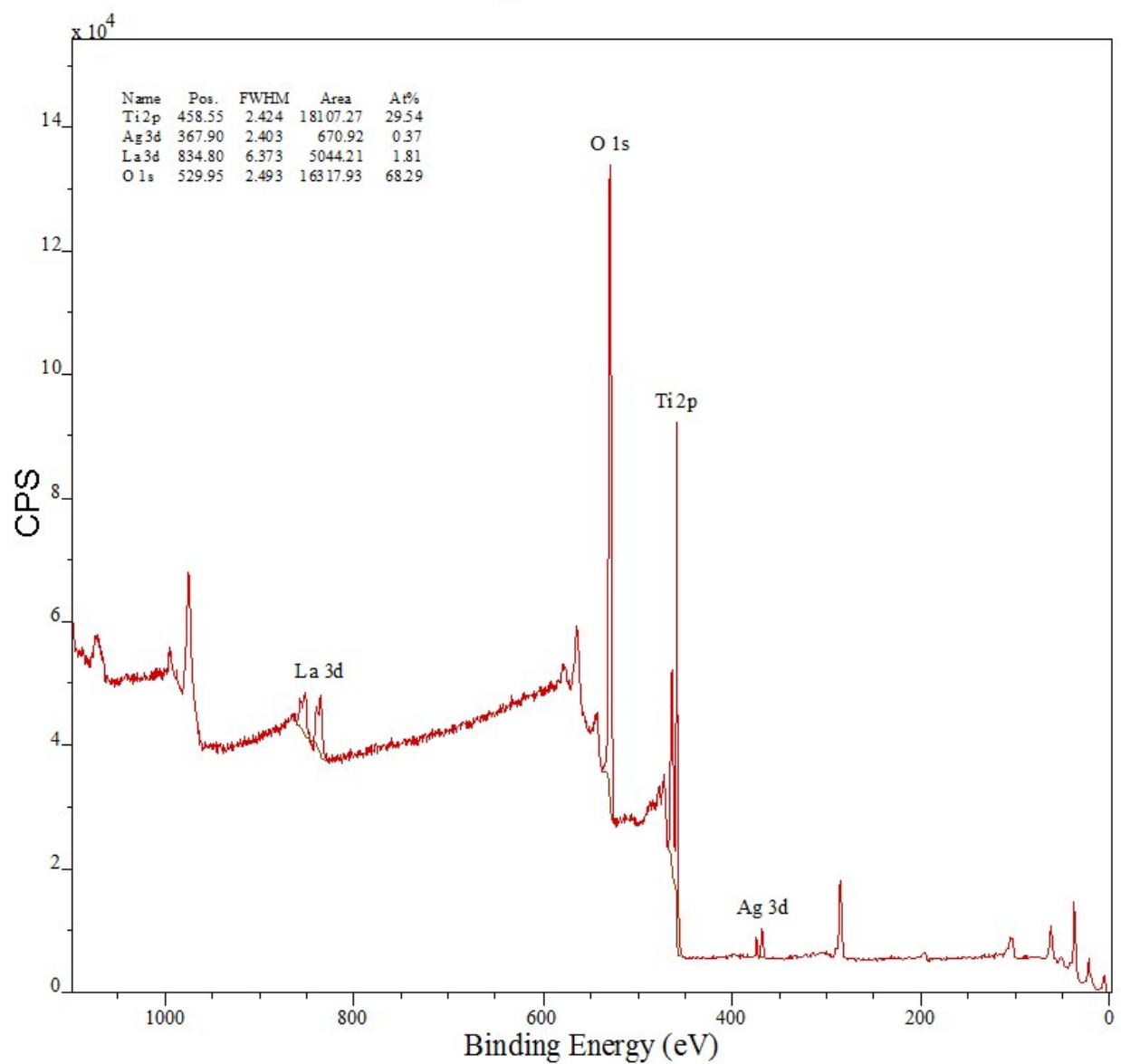


Figure S9. XPS scan of the Ag₂O/La₂O₃/TiO₂ sample.

Au-La₂O₃-TiO₂

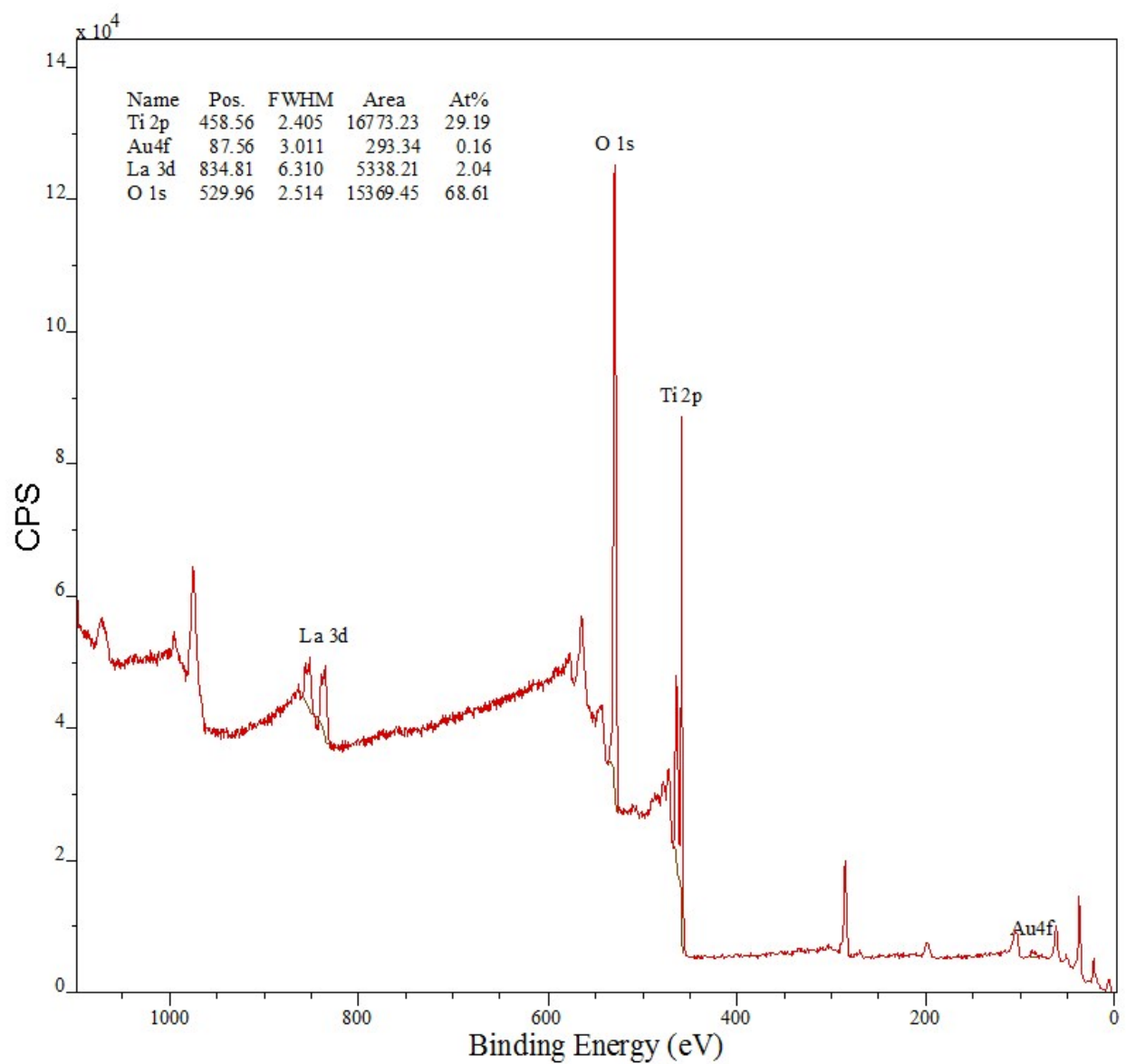


Figure S10. XPS scan of the Au/La₂O₃/TiO₂ sample.

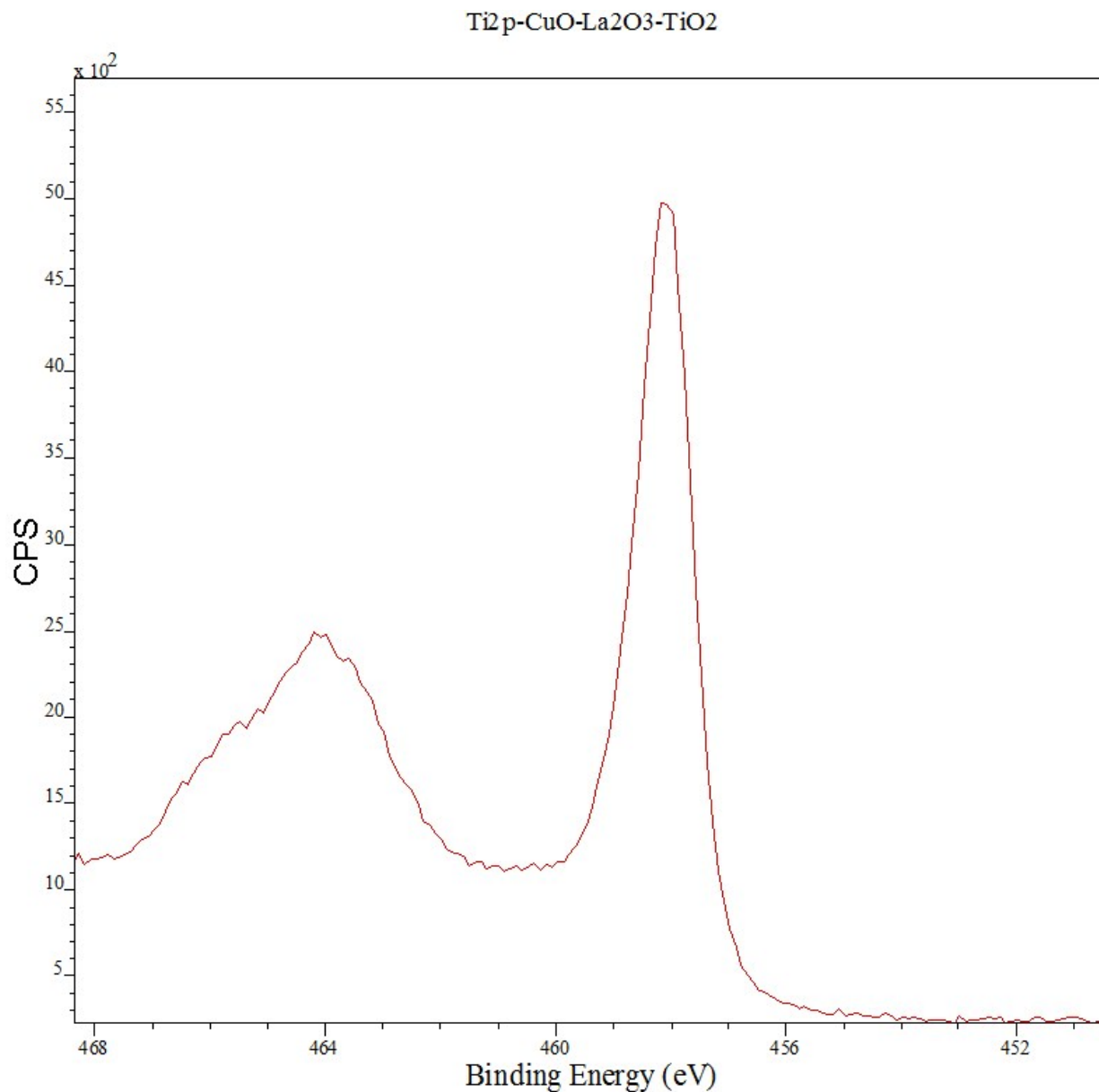


Figure S11. High resolution XPS, Ti_{2p} of CuO/La₂O₃/TiO₂. For Ti_{3p, 3/2}, binding energy = 458.1 eV, FWHM = 1.1 eV. It is noted that the FWHM in this HR XPS is different from the scan in Figure S8.

Ti2p-Ag2O-La2O3-TiO2

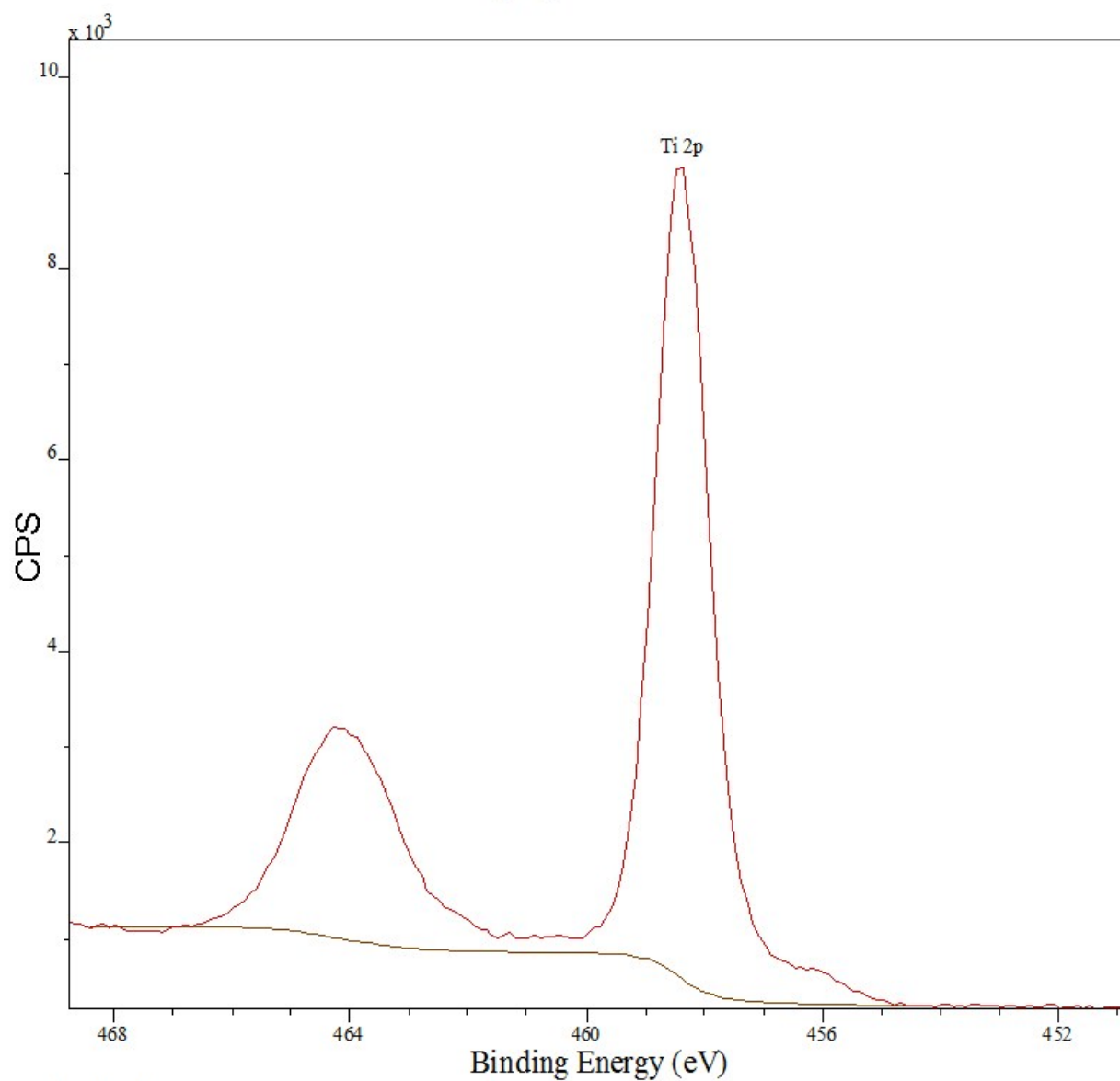


Figure S12. High resolution XPS, Ti_{2p} of Ag₂O/La₂O₃/TiO₂. For Ti_{3p, 3/2}, binding energy = 458.4 eV, FWHM = 1.0 eV. It is noted that the FWHM in this HR XPS is different from the scan in Figure S9.

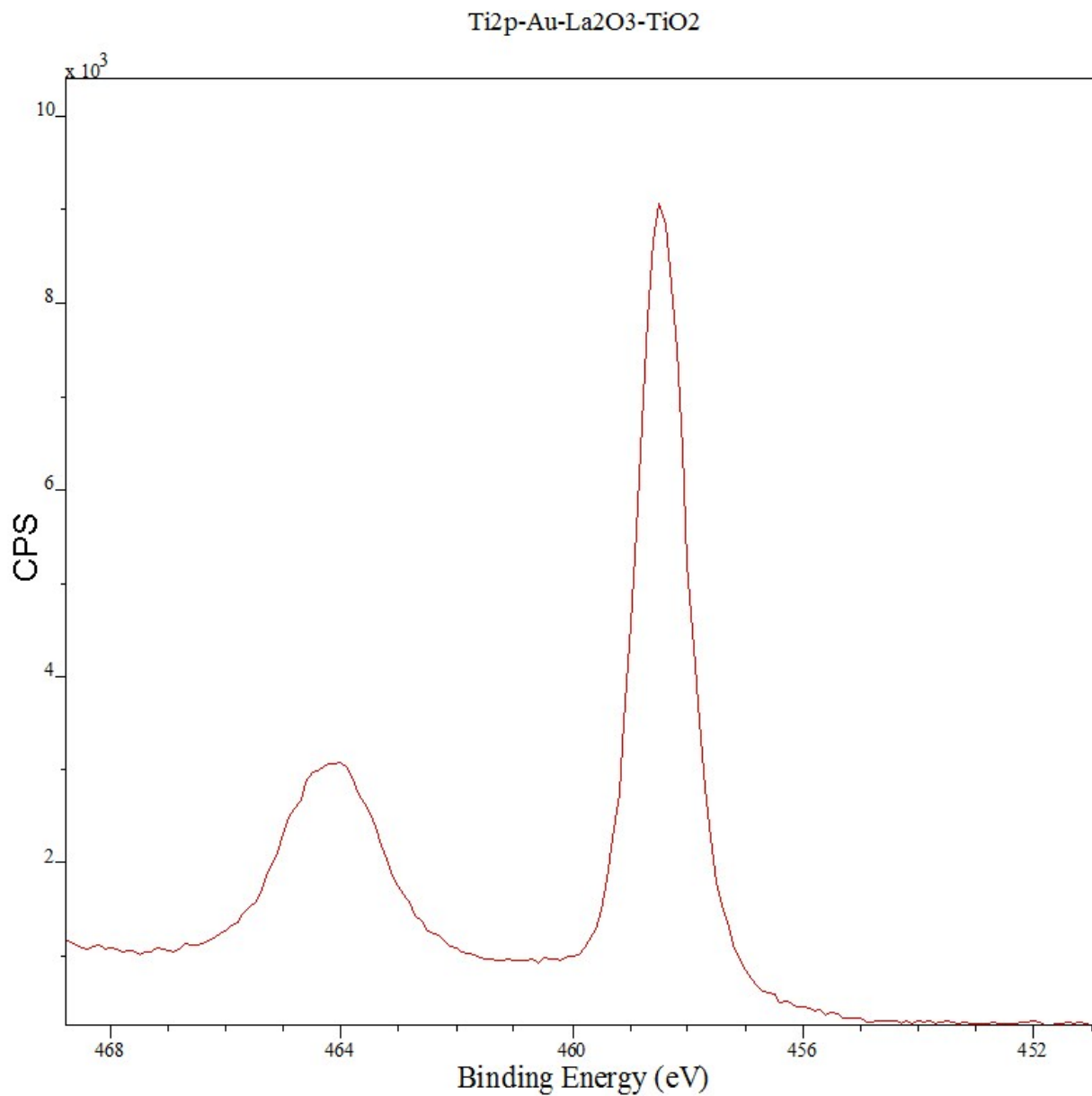


Figure S13. High resolution XPS, Ti_{2p} of Au/La₂O₃/TiO₂. For Ti_{3p, 3/2}, binding energy = 458.5 eV, FWHM = 1.0 eV. It is noted that the FWHM in this HR XPS is different from the scan in Figure S10.

La3d, CuO-La2O3-TiO2

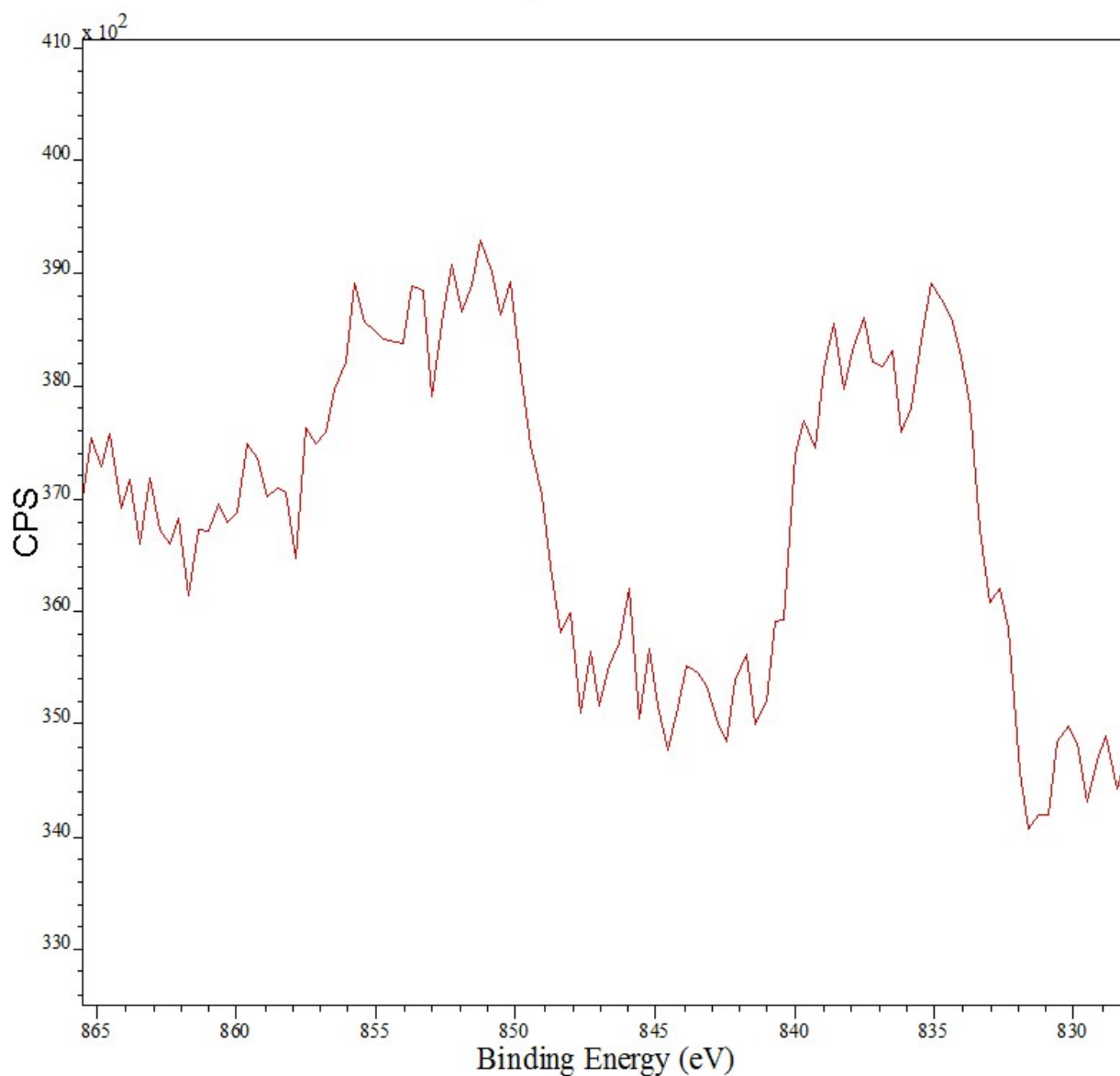


Figure S14. La_{3p} of CuO/La₂O₃/TiO₂. Binding energy = 834.8 eV, FWHM = 3.5 eV. It is noted that the satellite peaks are not separated well and the FWHM is manually obtained.

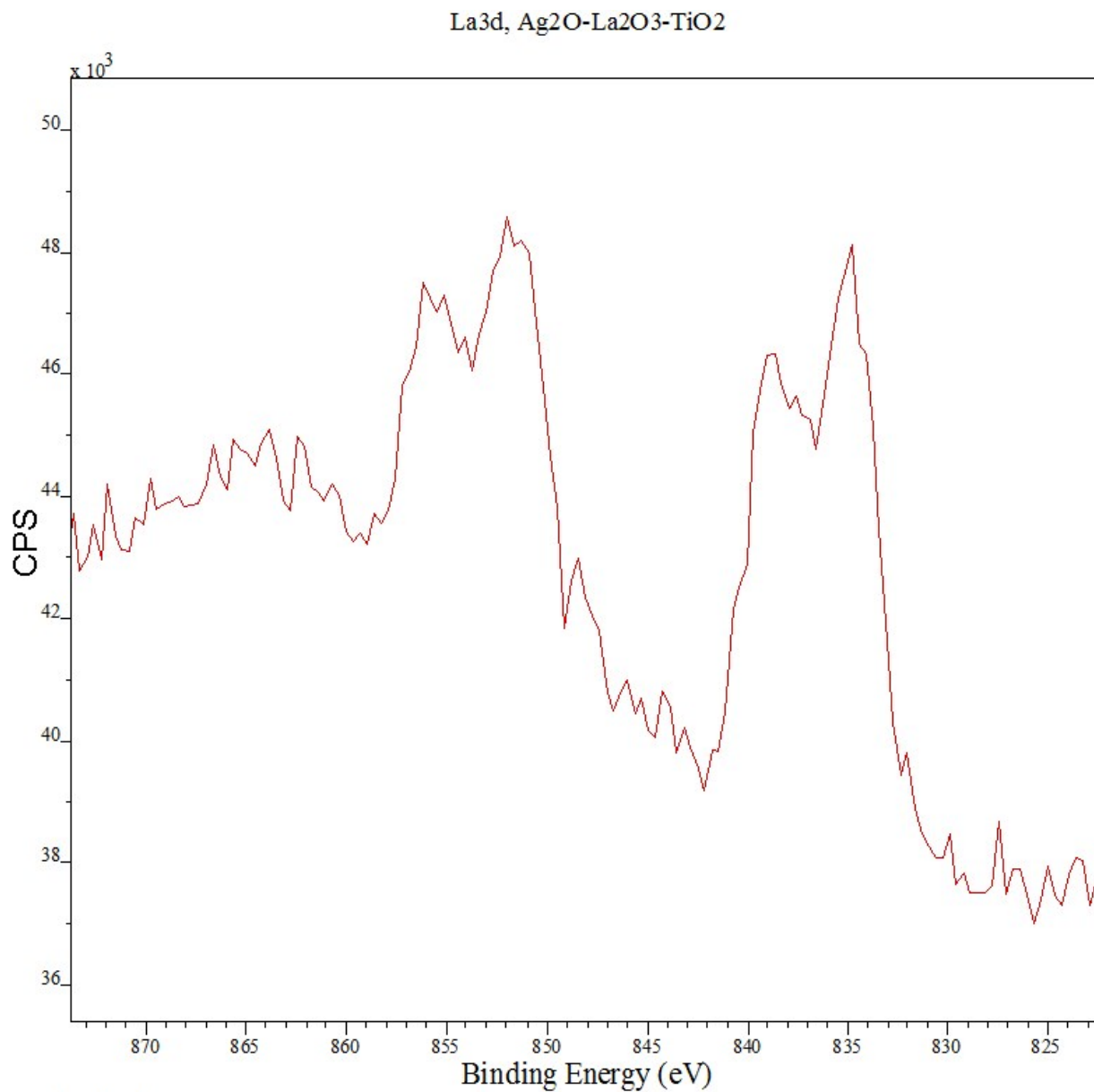


Figure S15. La_{3p} of Ag₂O/La₂O₃/TiO₂. Binding energy = 834.6 eV, FWHM = 3.5 eV. It is noted that the satellite peaks are not separated well and the FWHM is manually obtained.

La3d, Au-La2O3-TiO2

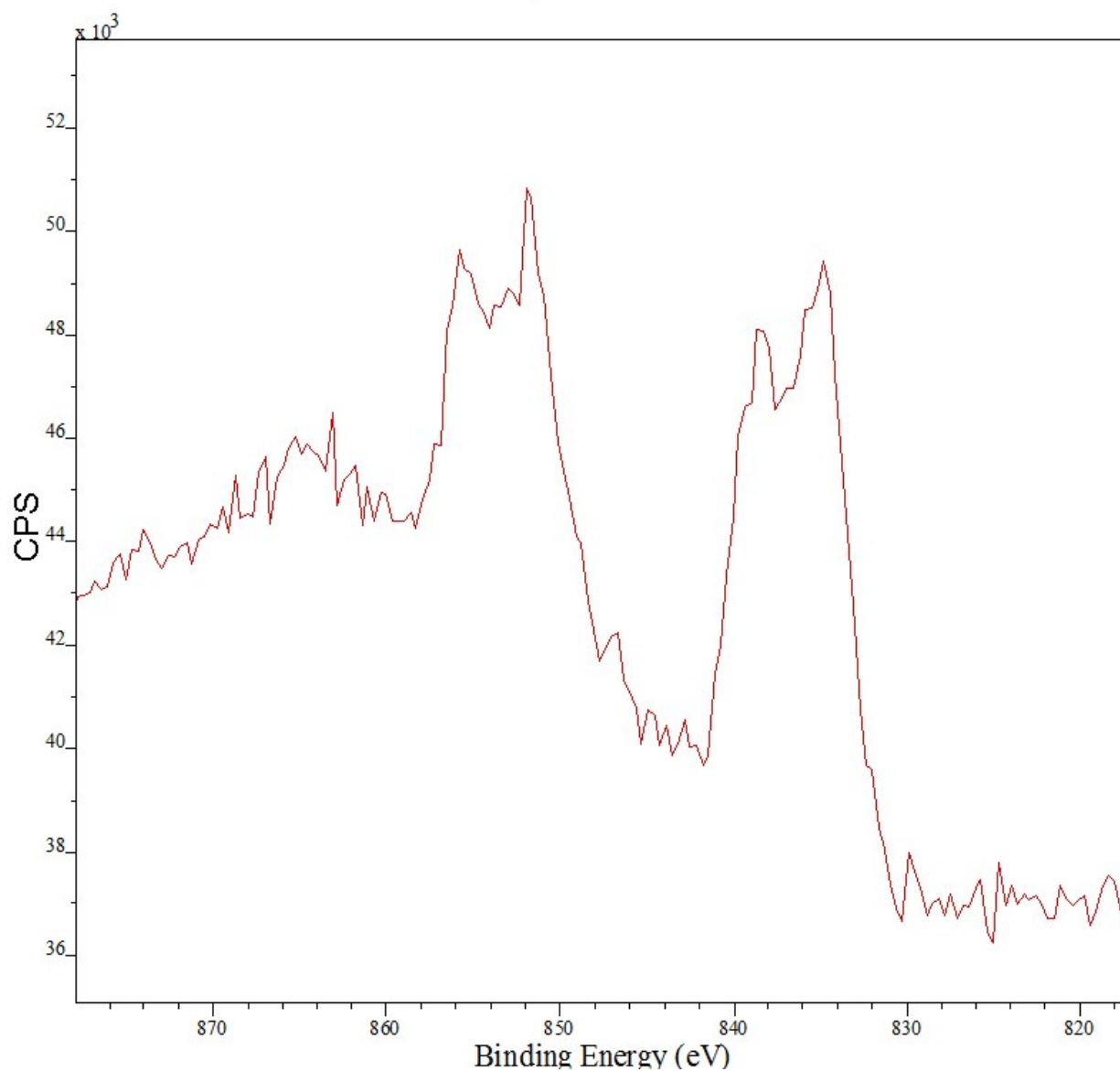


Figure S16. La_{3p} of Au/La₂O₃/TiO₂. Binding energy = 834.6 eV, FWHM = 3.5 eV. It is noted that the satellite peaks are not separated well and the FWHM is manually obtained.

La3d, La2O3-TiO2

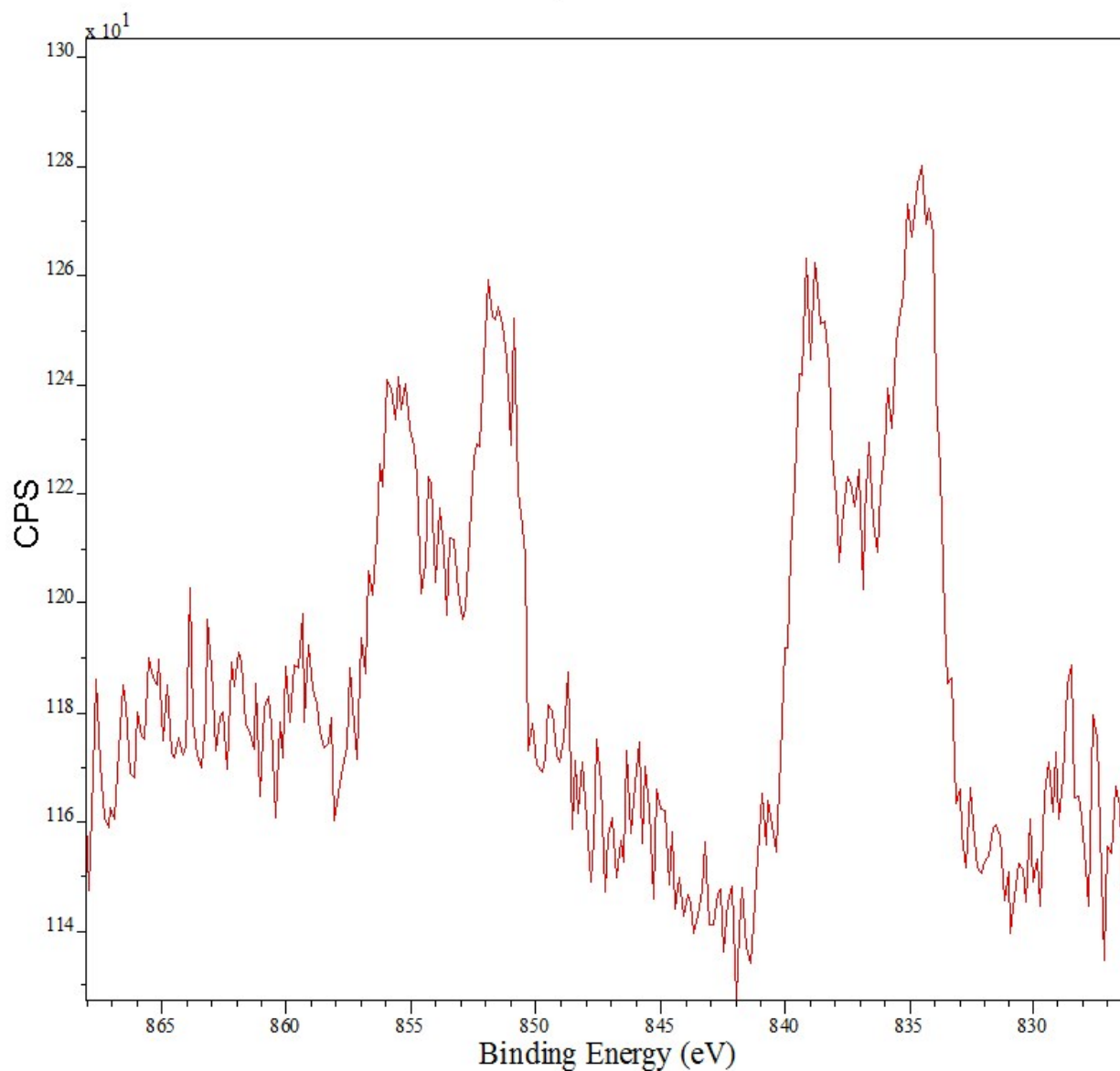


Figure S17. La_{3p} of La₂O₃/TiO₂. Binding energy = 834.8 eV, FWHM = 2.9 eV. It is noted that the satellite peaks are not separated well and the FWHM is manually obtained.

Table S1. Comparison of anatase crystallite sizes of fresh and used adsorbents.

| | Fresh D_{scher}^a (nm) | Spent D_{scher}^b (nm) |
|--|--------------------------|--------------------------|
| Au/La ₂ O ₃ /TiO ₂ | 10.7 | 10.7 |
| Ag ₂ O/La ₂ O ₃ /TiO ₂ | 9.7 | 9.7 |
| Cu ₂ O/La ₂ O ₃ /TiO ₂ | 9.7 | 9.7 |