

Bimetallic TiO₂ Nanoparticles for Lignin-Based Model Compounds Valorization by Integrating Photocatalytic Flow-Microreactor

Swaraj rashmi Pradhan ^{1, *}, Marta PaszkiewiczGawron ¹, Dariusz Łomot ¹, Dmytro Lisovytskiy ¹ and Juan Carlos Colmenares ^{1, *}

¹ Institute of Physical Chemistry, Polish Academy of Sciences, Kasprzaka 44/52, 01-224 Warsaw, Poland;

* Correspondence: jcarloscolmenares@ichf.edu.pl, srpradhan@ichf.edu.pl ; Tel.: +48 22 343 32152

Supplementary Information

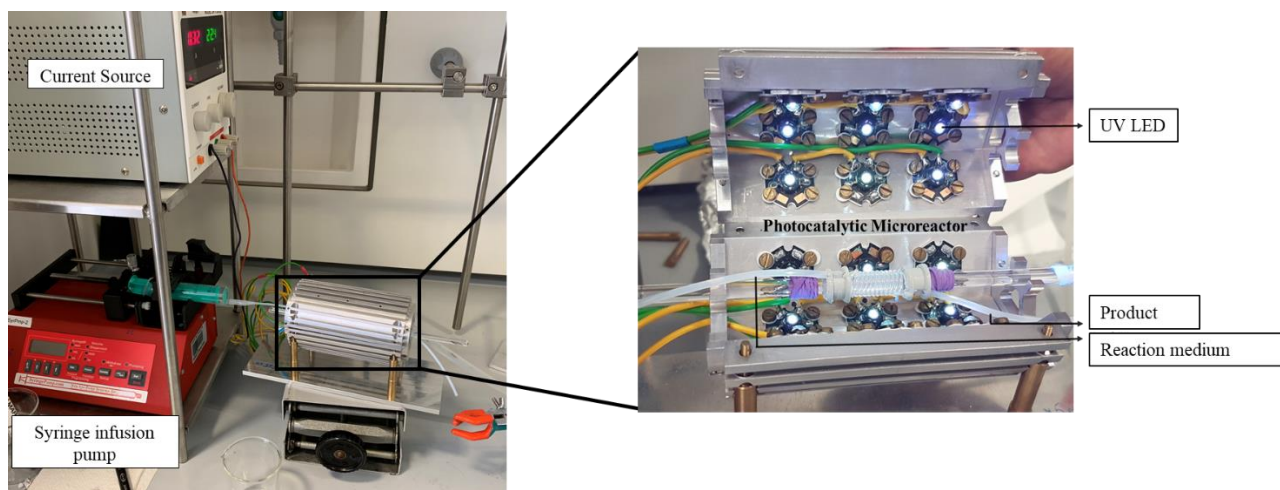


Figure S1. Experimental set up for photocatalysis in microflow system.

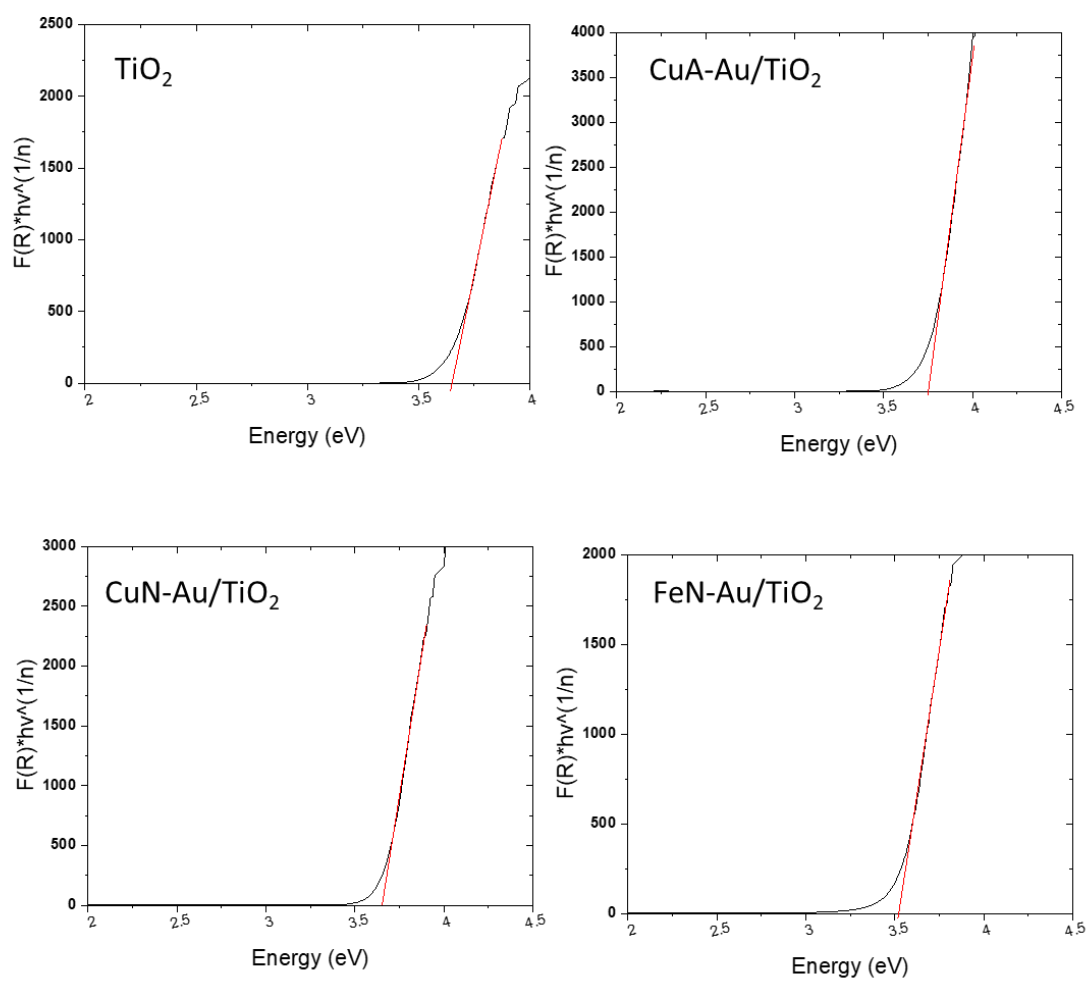


Figure S2. Bandgap calculation of sol-gel synthesized TiO₂ and bimetallic TiO₂ (CuA-Au/TiO₂, CuN-Au/TiO₂, FeN-Au/TiO₂) catalysts.

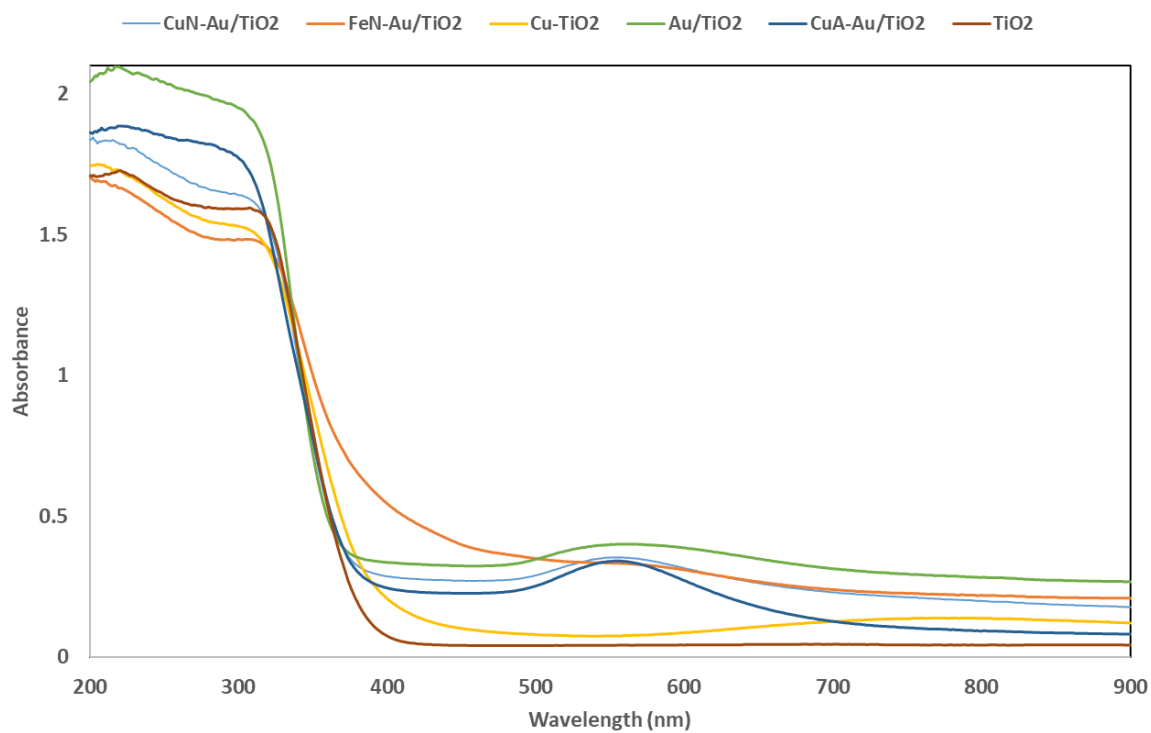


Figure S3. UV-vis diffuse reflectance spectra of synthesized bimetallic TiO₂.

Au-Cu-TiO₂_0001_1.SPE: survey, Al45, 500um2, 100um, 25W,15kV

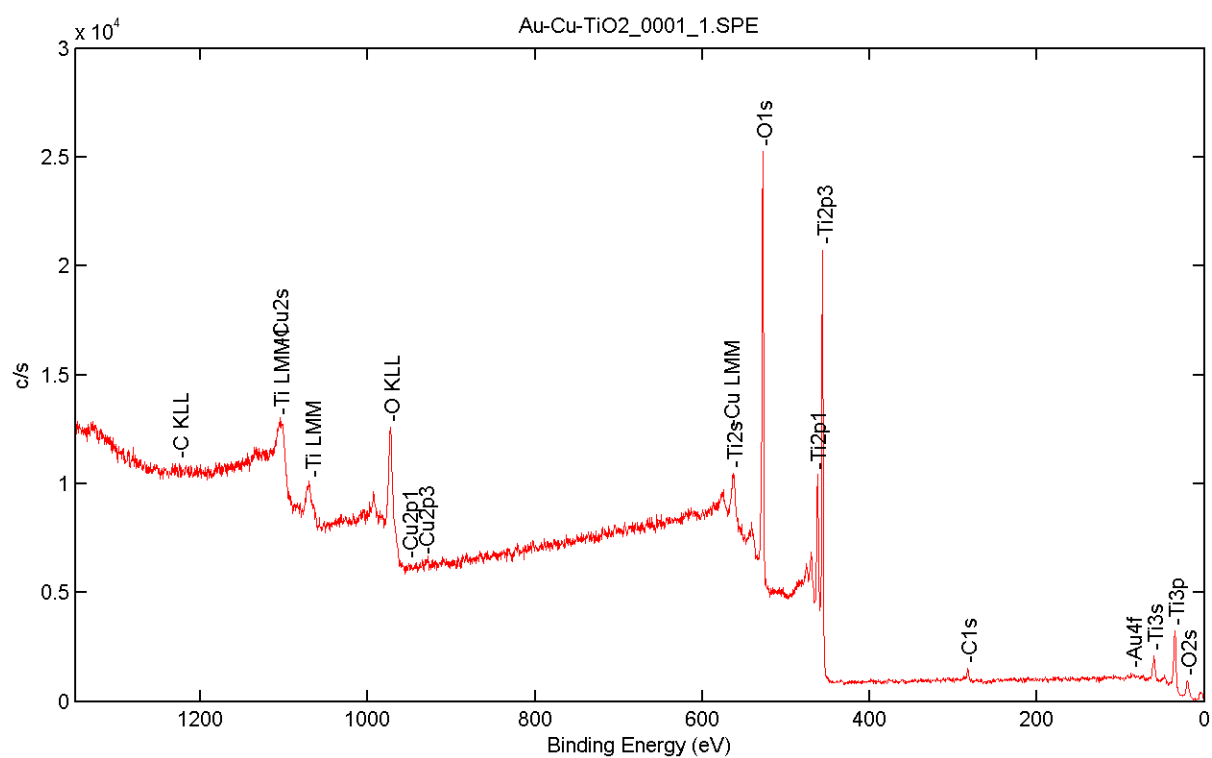
2022 Jul 8 Al mono 29.1 W 100.0 μ 45.2° 117.40 eV

2.5265e+004 max

Company Name

14.07 min

SUR/Area1/1



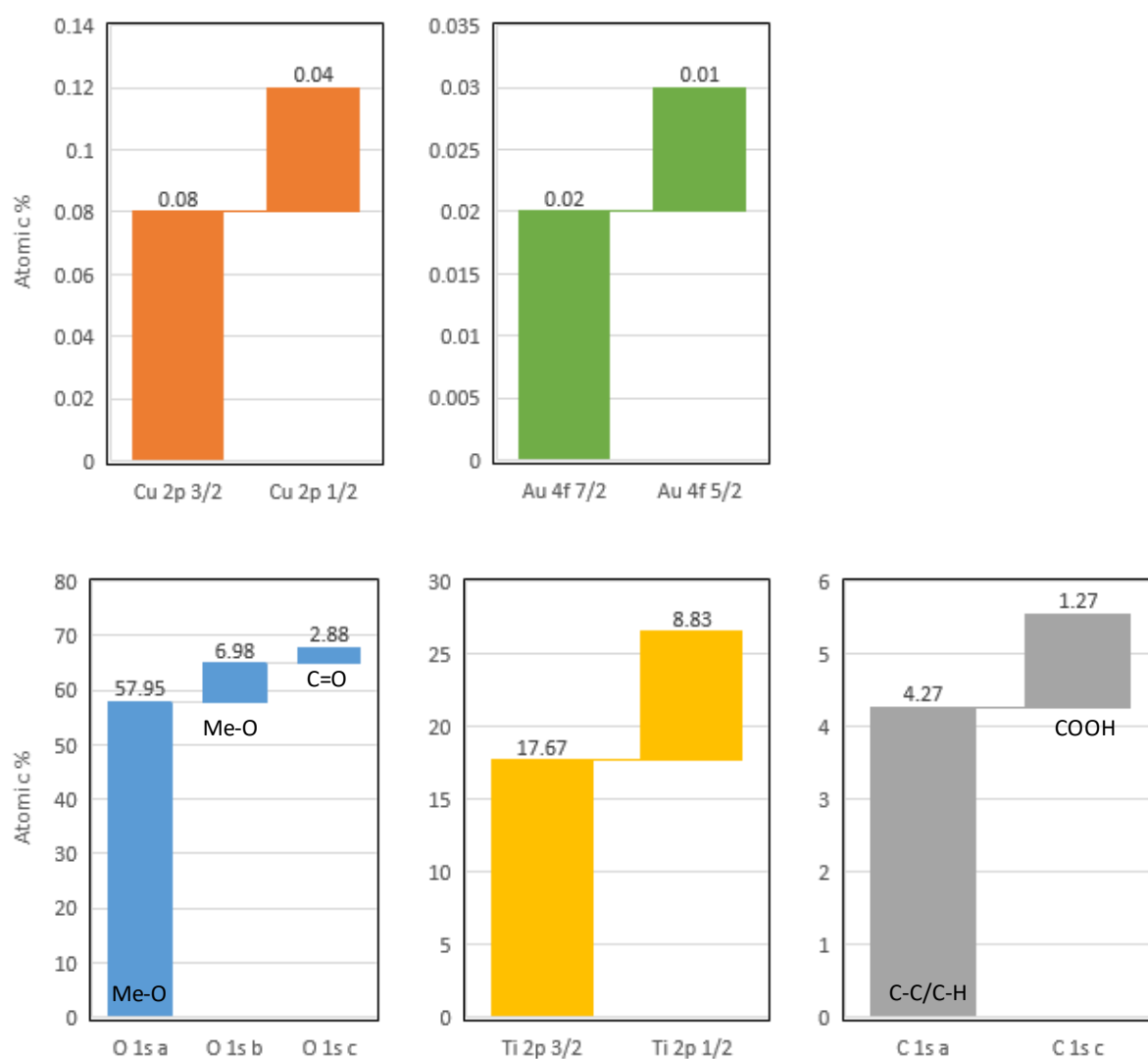


Figure S4. Surface analysis of CuA/Au-TiO₂ by X-ray photoelectron spectroscopy (XPS).

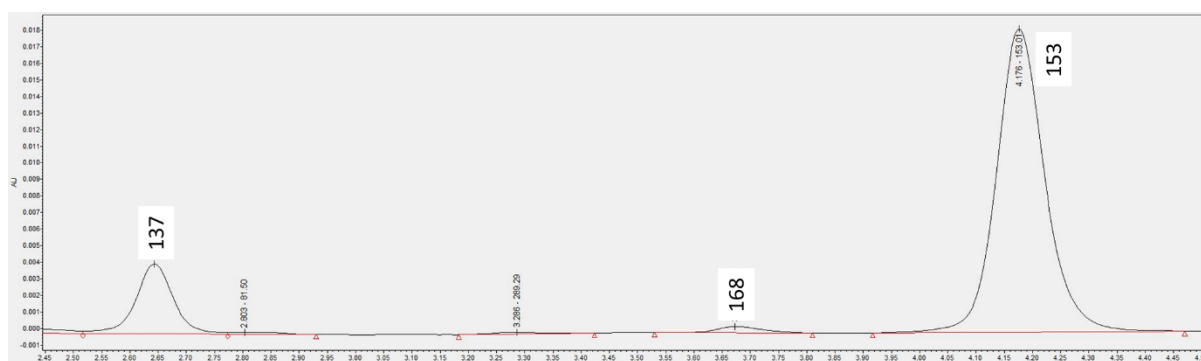
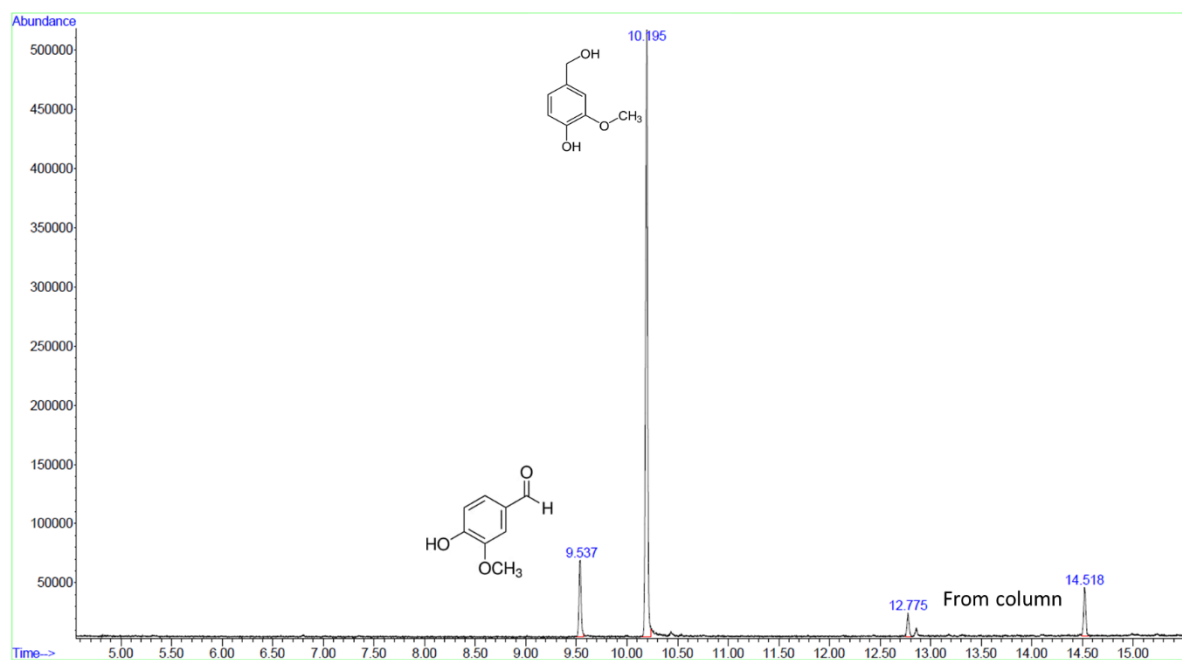


Figure S5. Oxidation products from VanOH analyzed with GC-MS and HPLC-MS.

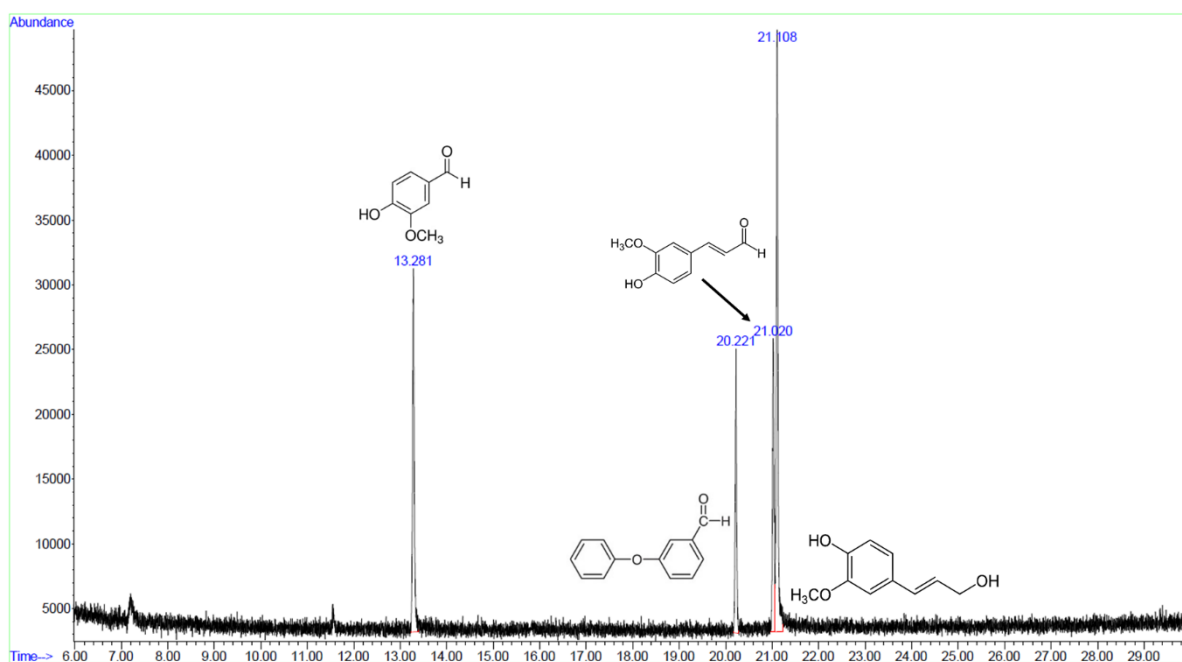


Figure S6. Oxidation products from ConOH analyzed with GC-MS.

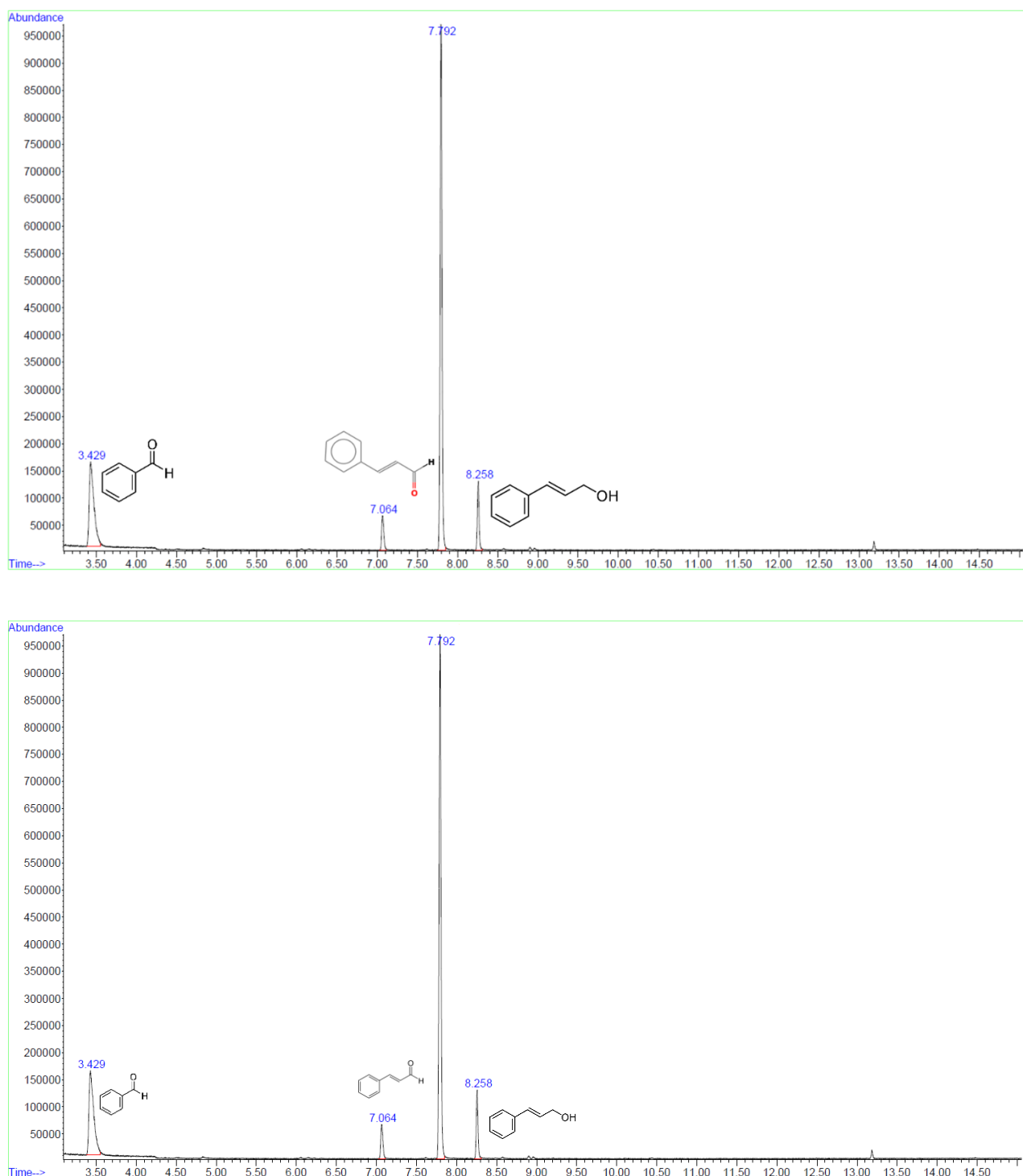
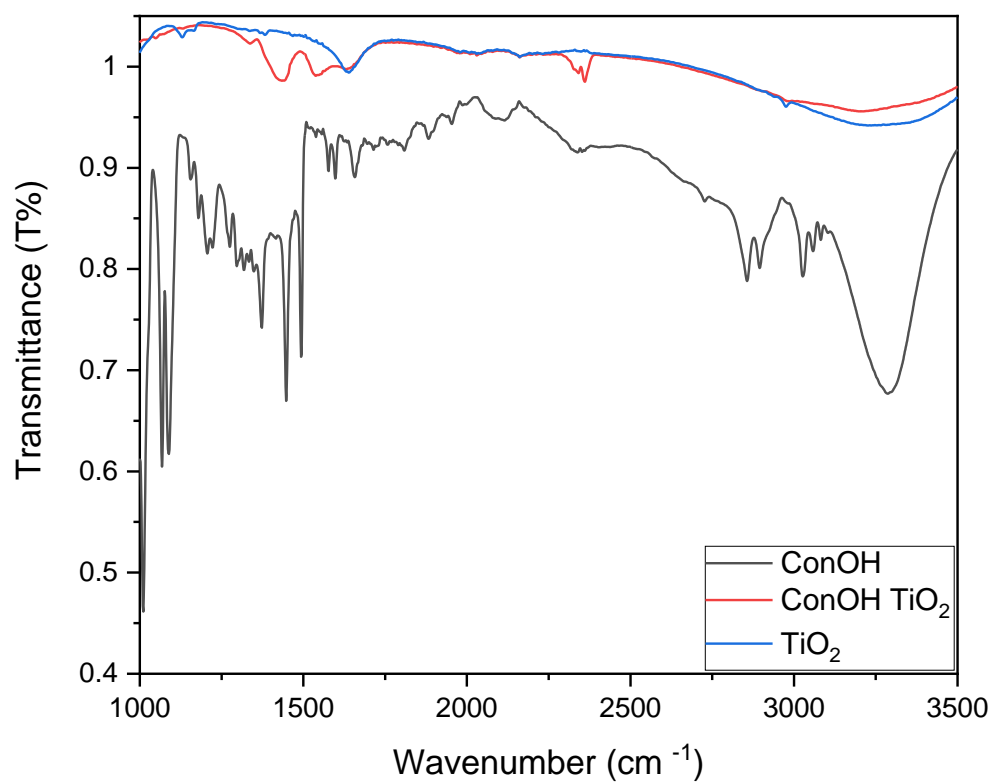
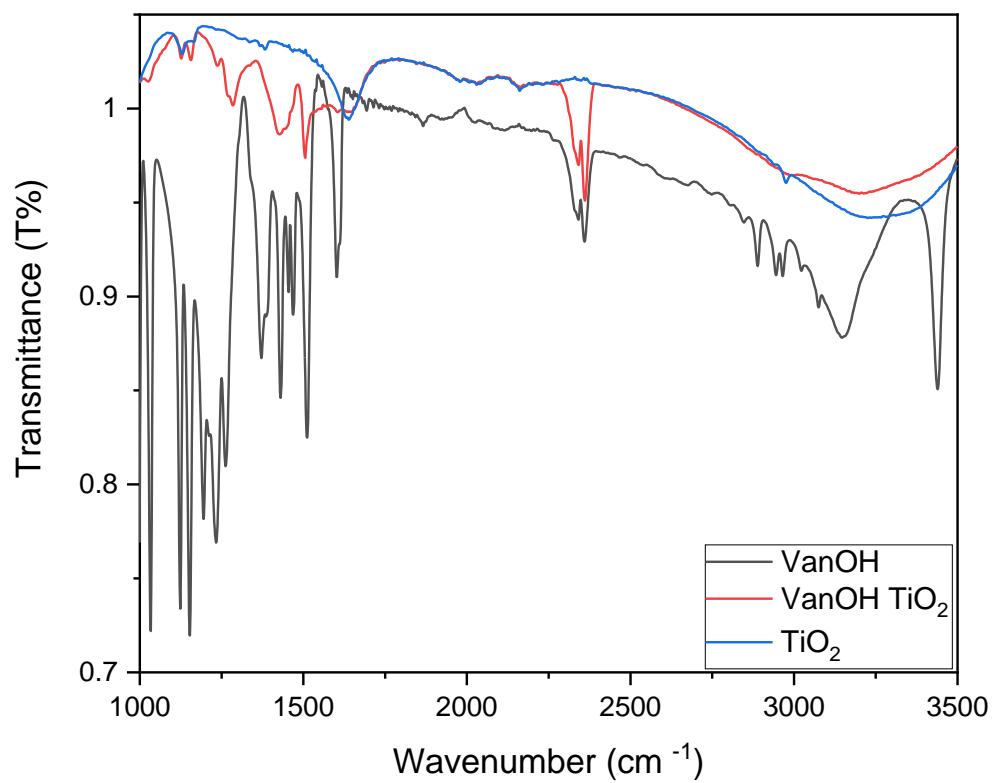


Figure S7. Oxidation products from CinOH analyzed with GC-MS.



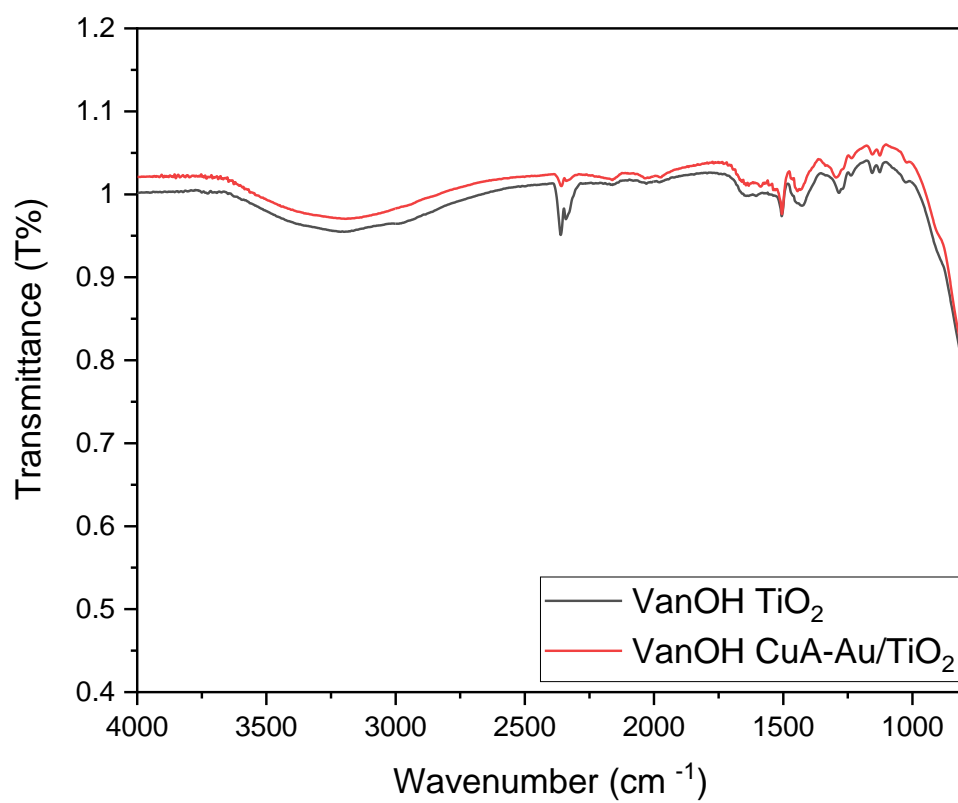
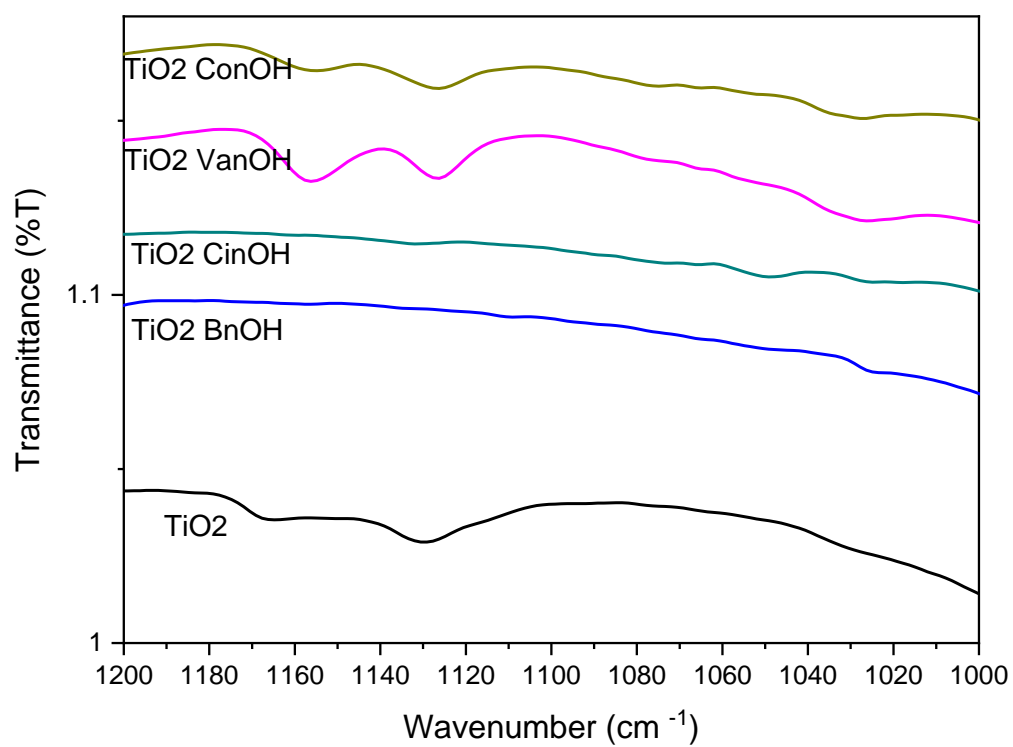


Figure S8. FT-IR spectra of aromatic alcohols (BnOH, CinOH, VanOH and ConOH) adsorbed TiO_2 and VanOH adsorbed bimetallic CuA-Au-TiO_2 .

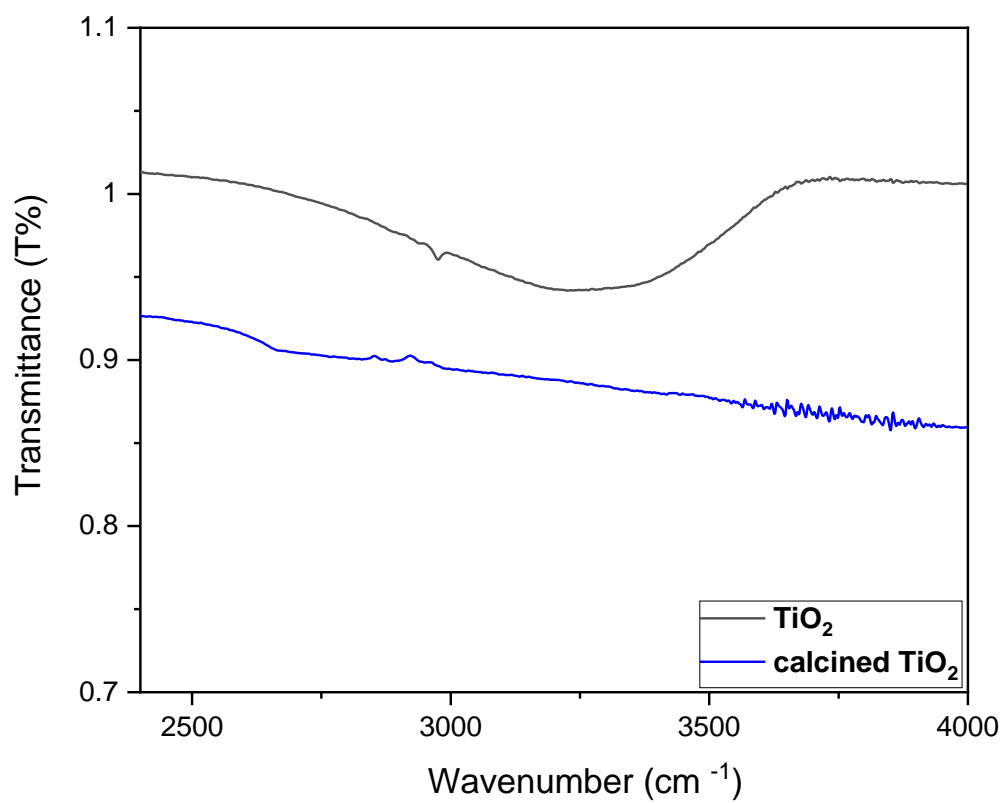


Figure S9. FT-IR spectra of sol-gel synthesized TiO_2 and calcined (600 °C) TiO_2 confirming removal of OH group.

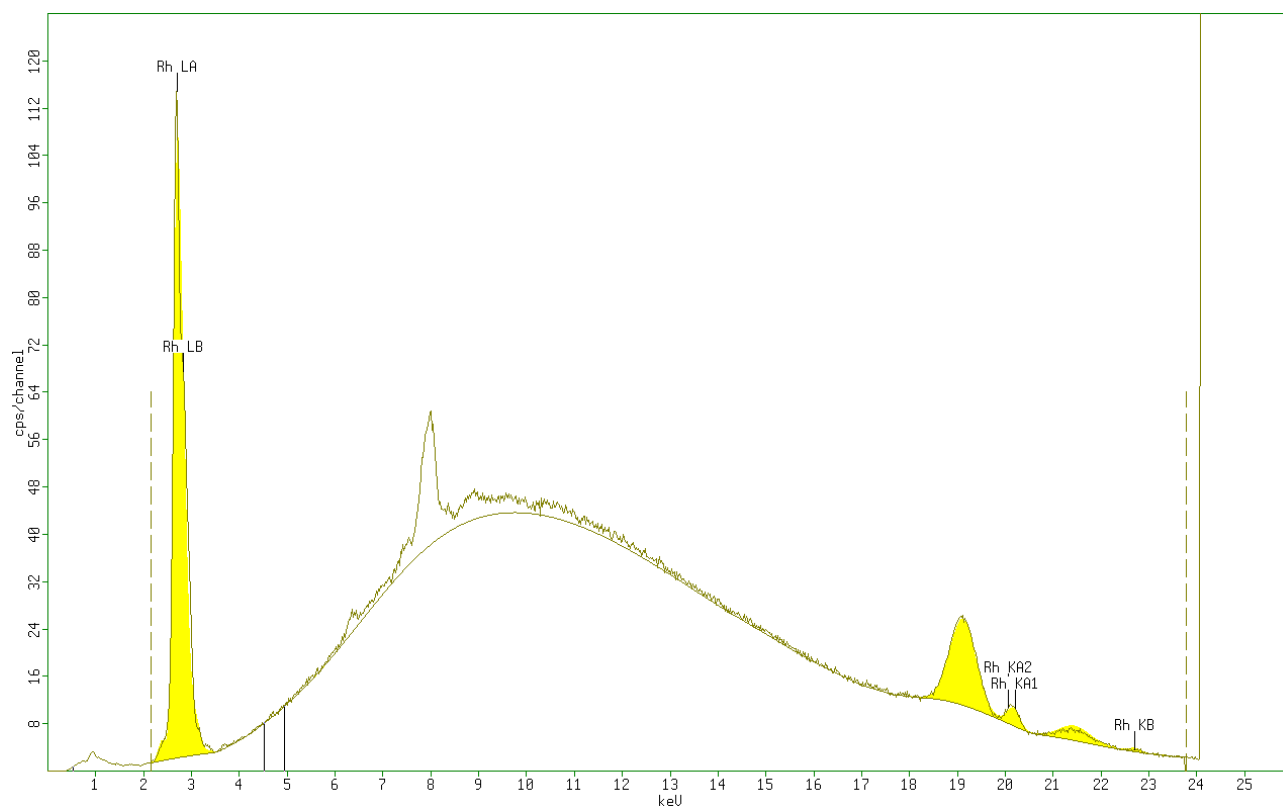


Figure S10. XRF image of CuN/Au-TiO₂.

Good reusability of the catalyst was demonstrated, while no metals were detected in the filtered reaction mixtures. There was no traces of Ti in liquid sample. The other observed peaks are the fingerprint from the instrument.

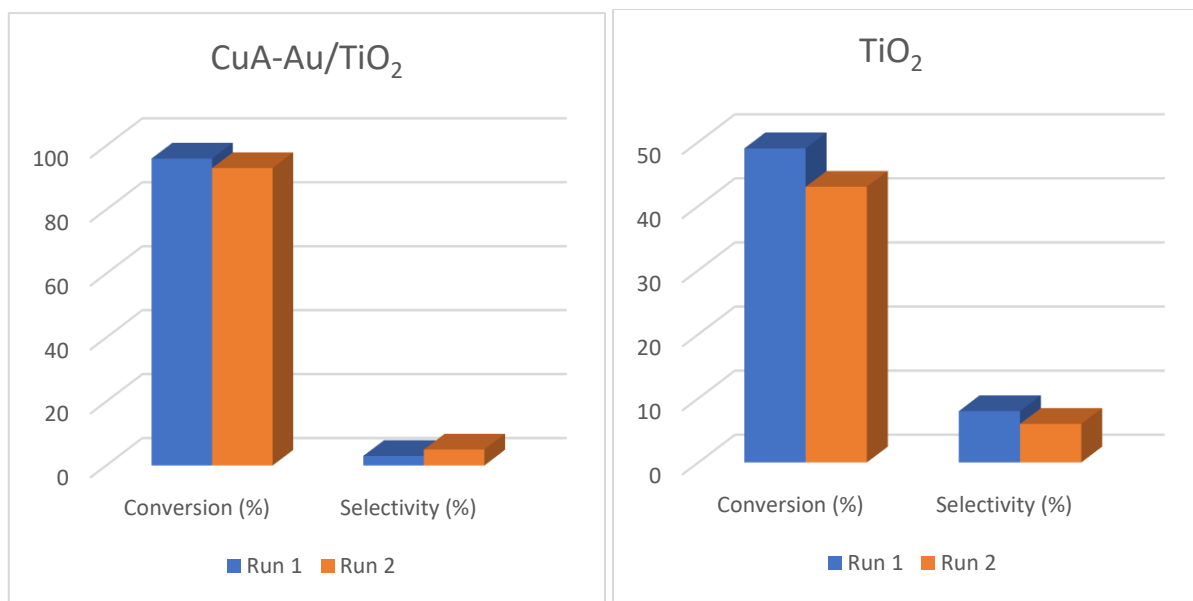


Figure S11. Photocatalytic experiment with CuA-Au/TiO₂ (left) and sol-gel synthesized TiO₂ (right) (Run 1) and after washing the catalyst with ACN and H₂O (Run2) under UV irradiation (60min) in batch system with ConOH.