

Supplementary Information:

Catalytic Evaluation of Microwave-Assisted Copper Cobaltite oxide (CuCo_2O_4) for Propane Oxidation

Nidia Guadalupe García-Peña^{1,2}, Rocío Redón³, Juan Ivan Gomez-Peralta⁴, David Díaz¹, Xim Bohkimi⁵, Lucy-Caterine Daza-Gómez^{6*}

¹Facultad de Química, Universidad Nacional Autónoma de México, Ciudad de México, 04510, Mexico

²Departamento de Física Aplicada, CINVESTAV-IPN, Antigua Carretera a Progreso km 6, A.P. 37, Mérida 97310, México

³Instituto de Ciencias Aplicadas y Tecnología, Universidad Nacional Autónoma de México, Cd. Universitaria, C.P. 04510, Coyoacán, Ciudad de México, México

⁴Laboratorio Nacional de Nano y Biomateriales, Antigua Carretera a Progreso km 6, A.P. 37, Mérida 97310, México

⁵Instituto de Física, Universidad Nacional Autónoma de México, A.P. 20-364, México City 01000, Mexico

⁶División de Ingeniería Mecánica e Industrial, Facultad de Ingeniería, Universidad Nacional Autónoma de México, Ciudad de México, México

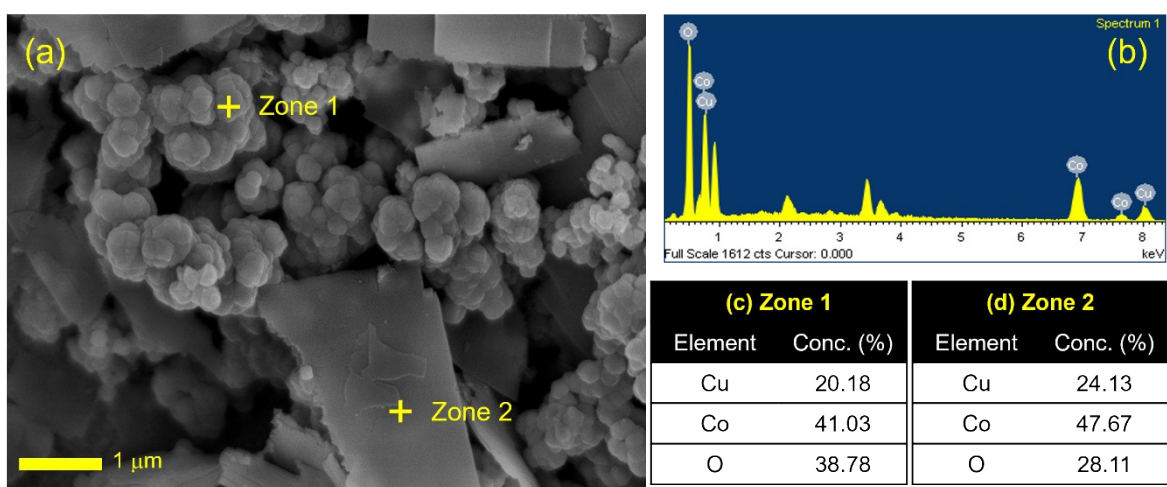


Figure S.1. EDS analyses on a sample of CoP. Two zones from the micrograph (a) were analyzed. As a result, spectra as the one shown in (b) were obtained. The resulting semiquantitative concentrations for both regions were calculated, which showed concentrations near the theoretical concentrations for Co and Cu in CuCo_2O_4 compound (25.9% and 48.3%, respectively).

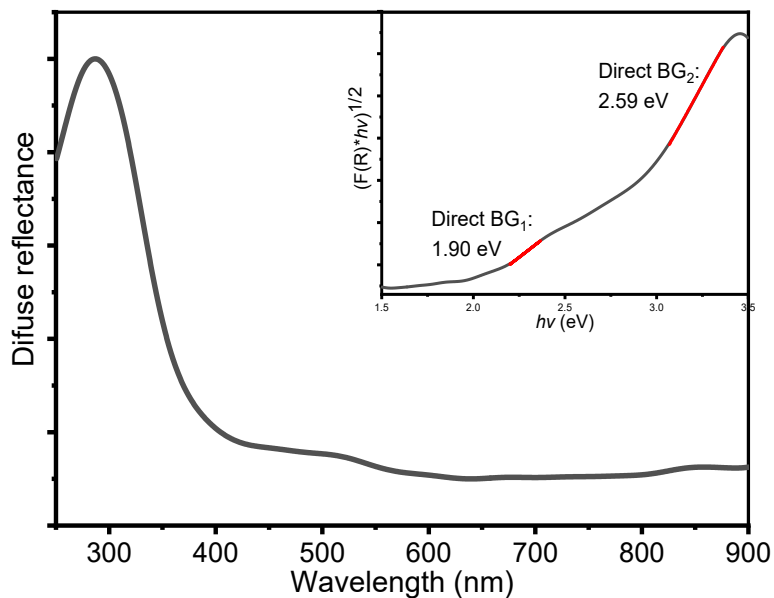


Figure S.2. Electronic adsorption spectroscopy in the UV-vis region, in reflectance mode, of a copper cobaltite sample. From this spectrum, the Kubelka-Munk graphic was calculated for direct band gaps (shown in inset). Two direct band gaps were calculated at 2.59 eV and 1.90 eV.

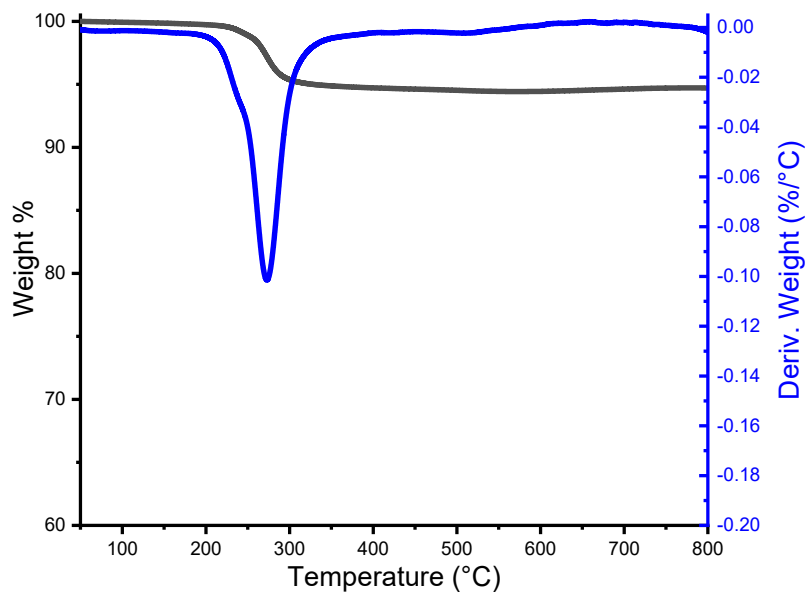


Figure S.3. Thermogram of a sample of copper cobaltite acquired under a 25 mL/min air flow from room temperature to 800 °C. A weight loss of 5.03% was detected in the 200°-334 °C range, perhaps due to some dehydration of surface hydroxyl groups formed during storage.

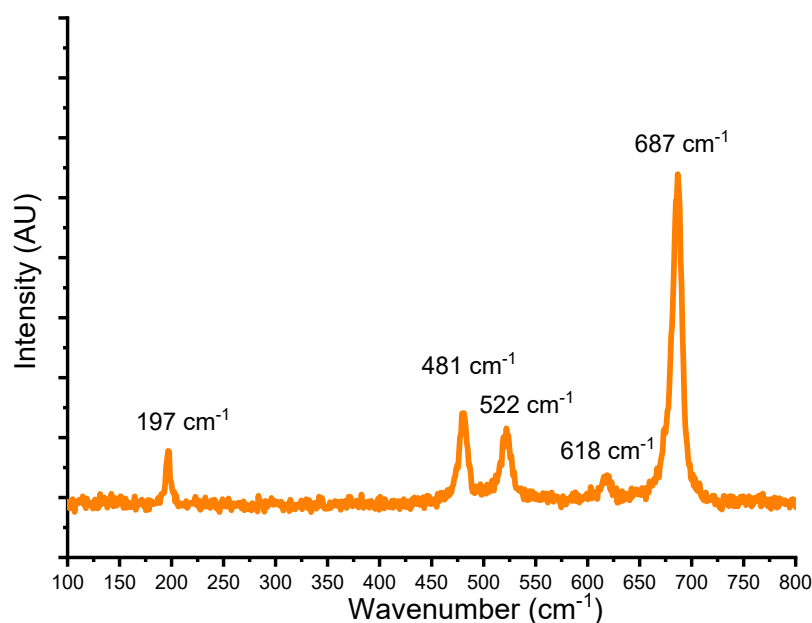


Figure S.4. Raman scattering spectroscopy analysis of a copper cobaltite sample. In the spectrum, five signals at 197 cm^{-1} , 481 cm^{-1} , 522 cm^{-1} , 618 cm^{-1} , and 687 cm^{-1} were detected. According to literature, these bands may be assigned to F_{2g} , E_g , F_{2g} , F_{2g} , and A_{1g} Raman-active modes from $M\text{Co}_2\text{O}_4$ spinel structures [49], [50].

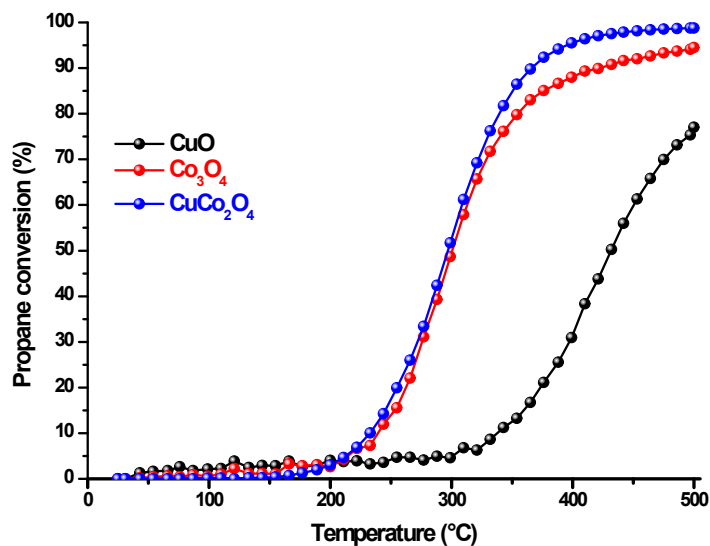


Figure S.5. Catalytic performance in the oxidation of propane was evaluated over a temperature range between 25 and 500 $^{\circ}\text{C}$, employing 10 mg of CuO, Co_3O_4 and CuCo_2O_4 obtained by MW, with a heating rate of 2 $^{\circ}\text{C}/\text{min}$.