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Ternary systems based on ZnO/CeO₂/Cu₂O for the degradation of phenol and carbamazepine

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2. Experimental section

2.1 Hydrothermal synthesis.

2.2 Precipitation synthesis.

2.3 Cupper modified oxide systems.

2.4 X-Ray Powder Diffraction

PANalytical PW3040/60 X'Pert PRO

obtained in the 2θ range between 20° and 80° . X'Pert High

2.5 UV Visible Diffuse Reflectance Spectroscopy (DRS)

absorption coefficient (α) for semiconductors in the region near the absorption edge is given by:

$$\alpha = \frac{2.303}{DR} \left(\frac{1 - R_\infty}{1 - R_\infty^2} \right)$$

Where $h\nu$

is the optical absorption energy. η depends

∞

$$\left(\frac{1 - R_\infty}{1 - R_\infty^2} \right) \propto L \frac{1 - R_\infty}{1 - R_\infty^2}$$

$\propto h\nu^{1/\eta}$ vs $h\nu$

2.6 BET surface area

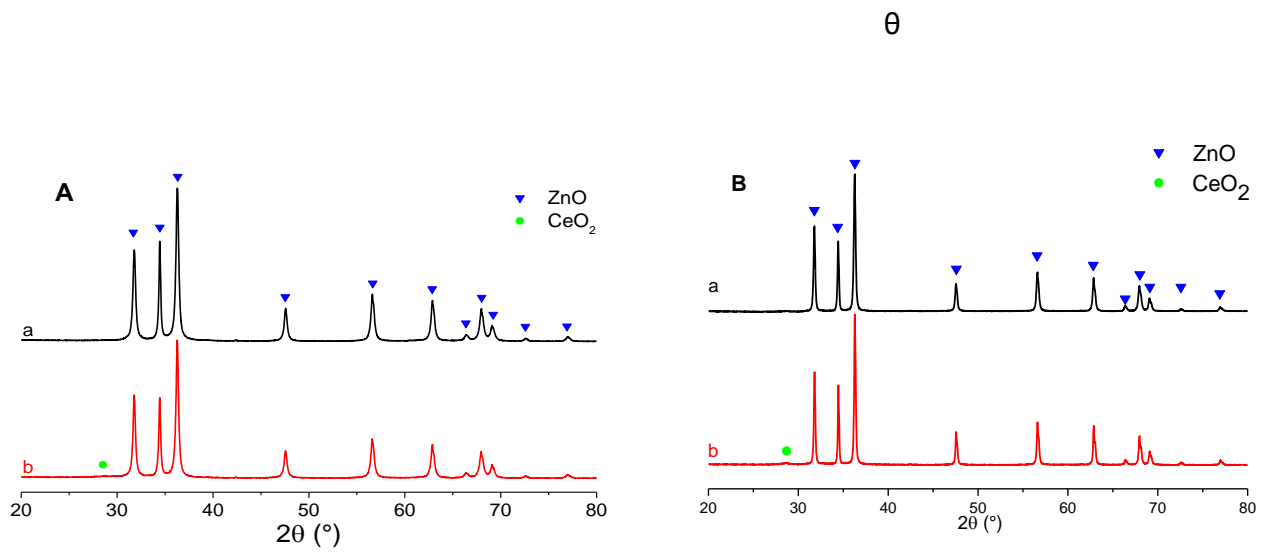


Figure 1. XRD patterns of the synthesized materials. Panel A: a) ZnO-Cu₂O-P and b) CZ1-Cu₂O-P. Panel B: a) ZnO-Cu₂O-H and b) CZ1-Cu₂O-H. The green dot evidences a weak diffraction peak due to CeO₂.

small size. In addition, the most intense reflections should be at 2θ angl

Nevertheless, XRD analysis didn't evidence the presence of copper(II) oxide, the occurred

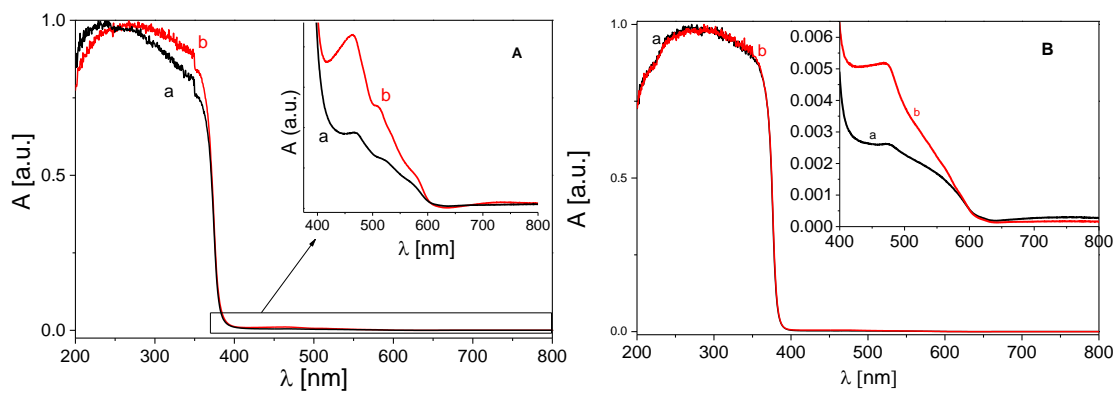


Figure 2. Normalized Absorbance Kubelka-Munk transformed diffuse reflectance spectra. Panel A: a) ZnO-Cu₂O-P and b) CZ1-Cu₂O-P panel B: a) ZnO-Cu₂O-H and b) CZ1-Cu₂O-H

3.2 EPR characterization of the Cu₂O impregnated materials

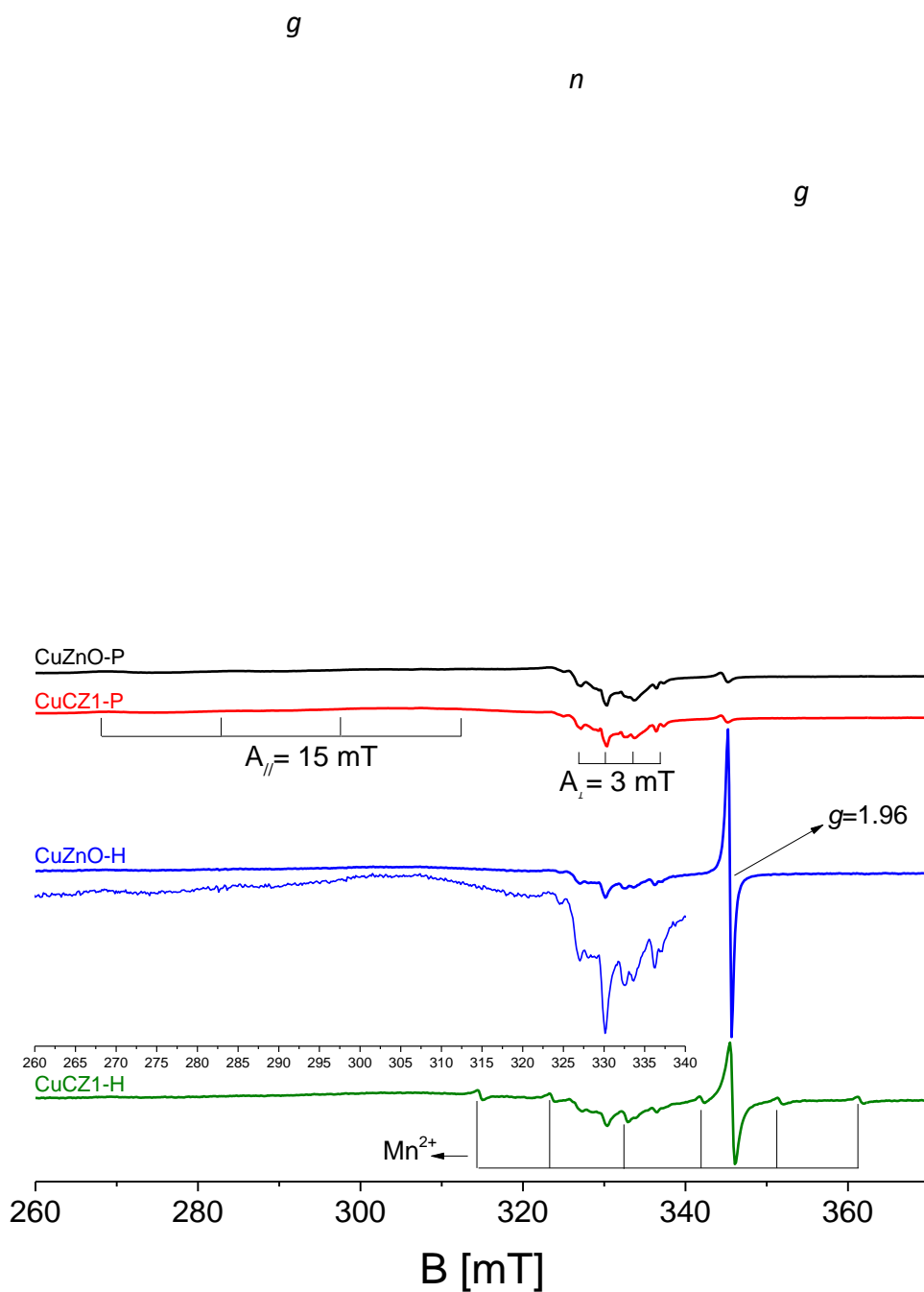


Figure 3. EPR spectra at 77K of ZnO-Cu₂O-P (black line), CZ1-Cu₂O-P (red line) ZnO-Cu₂O-H (blue line) and CZ1-Cu₂O-H (green line).

A//

A₁

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our case come as synthetic “waste”, caused by unavoidably oxidation during the synthesis

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3.3 Photocatalytic efficiency of the developed materials

3.3.1 Photocatalysts synthesized via precipitation

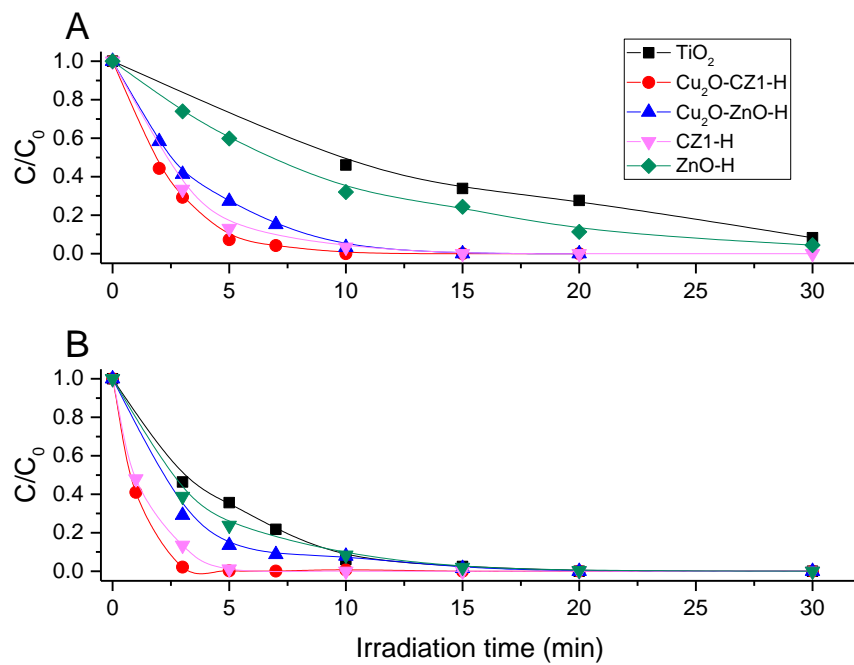


Figure 5

4. Conclusions

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