

Photocatalytic conversion of lignin model compounds

S. D. Rojas^{1,2*}, G. Rafaela¹, N. Espinoza-Villalobos¹, R. Salazar³ and L. Barrientos^{1†}

¹Centro de investigación en Nanotecnología y Materiales CIEN-UC, Facultad de Química y de Farmacia, Pontificia Universidad Católica de Chile, Avenida Vicuña Mackenna 4860, Santiago, Chile.

²Escuela de Ingeniería Industrial, Facultad de Ingeniería, Universidad de Valparaíso, Valparaíso, Chile.

³Departamento de Química de los materiales, Laboratorio de electroquímica Medio ambiental, LEQMA, Chile.

*susana.rojas@uv.cl, †lbarrientop@uc.cl

Abstract

Valorization of lignin as a renewable source of organic matter is a critical challenge in the replacement of fossil fuel economy. In this work, we perform the photocatalytic oxidation under visible light of two lignin model compounds (phenol and guaiacol) using different nanomaterials as photocatalyst. Synthesis and characterization of semiconductor nanomaterial was performed. Photocatalytic oxidation of selected compounds was carried out at room temperature using visible light. Analyte conversion and intermediary compounds were identified and quantified using high efficiency liquid chromatography. A high conversion rate of lignin model compounds was achieved under different conditions, and high selectivity to p-benzoquinone was observed. Exploration of the photocatalytic oxidation mechanism was explored by EPR operando mode and addition of radical scavenger. A possible reaction pathway was proposed, in which the photogenerated $\cdot\text{OH}$ radical plays an important role[1].

Aknowledgments: To Unidad de Equipamiento Científico, MAINI, of Universidad Católica del Norte (UCN-Chile) through Fondecyt Program XPS EQM 140044 (2014e2016) of Conicyt-Chile, ANID Fondecyt Postdoctoral fellowship N° 3210554, ANID Convocatoria Nacional Subvención a la Instalación en la academia convocatoria 2021 SIA SA77210032.

References

[1] Rojas, S. D., et al. Journal of Photochemistry and Photobiology A: Chemistry, 113513 (2021).