

PhD Candidate Profile

Name:

Dominic Aboagye

Research Group (if relevant):

Heterogeneous Catalysis (CATHETER) Group

Research Centre (if relevant):

N/A

**Department/School(s) (if relevant):**

Department of Chemical Engineering / Technical School of Chemical Engineering

College:

Universitat Rovira I Virgili

Supervisor(s):

Dr. Sandra Contreras

Prof. Francesc Medina

Funding body:

(include herewith the Martí I Franquès reference)

Area (field) of study:

Biomass valorisation -, advanced oxidation processes, heterogeneous catalysis.

Thesis Title:

"Development of photocatalytic approaches for the conversion of lignin into high-value platform chemicals"

Abstract:

Lignin, a major component of lignocellulosic biomass is an abundant natural source of aromatic building blocks. The circular bioeconomy portfolio is expected to unlock the full potential of resources sustainably. However, the prevalence of highly complex and amorphous three-dimensional nature phenylpropane units (coniferyl, sinapyl, and p-coumaryl alcohol) makes lignin the least exploited component of lignocellulosic biomass. Consequently, prevailing efforts to fully unlock the potential of lignin is still far from reaching due to use of energy intensive processes with robust reaction conditions which are not environmentally friendly. Thanks to its ability to promote milder operation conditions, radical-mediated photocatalysis has become a hot area of research in lignin chemistry. Inspired by this, our research involves the identification of facile pretreatment and photocatalytic oxidation strategies including photocatalyst design, characterization, process optimization and elucidating the mechanistic routes for the cleavage and functionalization of key lignin bonds to aromatic-based platform chemicals.

Collaborations:

N/A

Publications:

Aboagye, D., Djellabi, R., Medina, F., & Contreras, S. (2023). Radical-Mediated Photocatalysis for Lignocellulosic Biomass Conversion into Value-Added Chemicals and Hydrogen: Facts, Opportunities and Challenges. *Angewandte Chemie-International Edition*. doi.org/10.1002/anie.202301909

Aboagye, D., Medina, F., & Contreras, S. (2023). Toward a facile depolymerization of alkaline lignin into high-value platform chemicals via the synergetic combination of mechanocatalysis with photocatalysis or Fenton process. *Catalysis Today*, 413, 113969. doi.org/10.1016/j.cattod.2022.11.030

Djellabi, R., **Aboagye, D.**, Galloni, M. G., Andhalkar, V. V., Nouacer, S., Nabgan, W., ... & Contreras, S. (2022). Combined conversion of lignocellulosic biomass into high-value products with ultrasonic cavitation and photocatalytic produced reactive oxygen species-A review. *Bioresource Technology*, 128333. doi.org/10.1016/j.biortech.2022.128333

Presentations:

11th European Conference on Solar Chemistry and Photocatalysis: Environmental Applications (SPEA), held in presence in Turin, Italy, on June 6-10, 2022.