

Book of Abstracts

of the

Symposium on Environmental Engineering

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LEADING THE CHANGE FOR A GREENER FUTURE

SYMPOSIUM ON ENVIRONMENTAL ENGINEERING



This volume contains the peer-reviewed and accepted abstracts presented at the Symposium on Environmental Engineering of the 6th Doctoral Congress in Engineering – DCE25, held at the Faculty of Engineering of the University of Porto (FEUP), between June 30th and 1st July, 2025.

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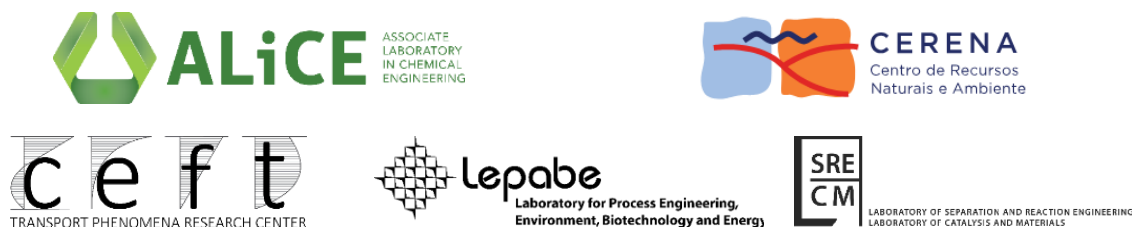
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WELCOME

Message from the Organizing Committee

We warmly welcome all participants to the Symposium on Environmental Engineering (SEE), held in the scope of the 6th Doctoral Congress in Engineering (DCE25), hosted at the Faculty of Engineering of the University of Porto (FEUP), Portugal, on the 30th June and 01st July 2025.

This Symposium is organized by PhD students of the Doctoral Program in Environmental Engineering (PDEA) at FEUP, with the support of the Associate Laboratory ALiCE (integrating the R&D Units LEPABE, LSRE-LCM and CEFT) and CERENA.



The Symposium covers a wide range of themes in the field of Environmental Engineering, aligned with the UN Sustainable Development Goals. It includes both oral and poster presentations, mainly covering the following topics:

- Water and Wastewater: New Directives, New Opportunities, New Challenges
- Waste Management: Towards New Approaches
- Clean Air and Energy: Becoming Accessible for All
- Sustainability and Innovation: Seeking a New Future

We are truly grateful to our invited speakers for accepting our invitation and sharing their expertise, thereby enhancing the quality and impact of the Symposium.

The Symposium received 81 submissions, reviewed with the support of the Scientific Committee, resulting in 17 oral and 64 poster presentations.

We would like to take this opportunity to express our sincere appreciation to all authors for their valuable contributions, as well as to the Symposium Organizing Committee, the Scientific Committee, Associate Laboratory ALiCE (comprising the R&D Units LEPABE, LSRE-LCM, and CEFT), CERENA, and all participating institutions for their invaluable support.

Porto, June 2025

The Symposium Organizing Committee

PC 43. Sustainable Hydrogen Production Using Biomass Waste

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Abstract

To reduce global dependence on fossil fuels and tackle the climate crisis, it is essential to invest in innovative solutions that enable the production of sustainable fuels, thereby contributing to carbon neutrality. Among these alternatives, hydrogen (H₂) stands out as a clean option with significant potential for applications in transportation and energy storage sectors. However, the most widely used method for its production, steam methane reforming, presents several limitations, including high carbon dioxide emissions and substantial energy consumption. Photocatalysis using biomass waste emerges as an innovative and promising approach, as biomass acts as a sacrificial agent, providing the electrons necessary for H₂ production [1]. To optimize the photocatalytic process, a low loading (1.0 %w/w) of platinum (Pt) was introduced onto the optical semiconductor graphitic carbon nitride (GCNT) via the incipient method. This material is particularly notable due to its ability to be photoactivated within the visible range of the electromagnetic spectrum [2]. Various types of biomass waste, including banana peel, orange peel, lemon peel, lemon tree leaves, daisy flowers, grass, corncob, and coffee, were evaluated to identify their potential for H₂ generation. Among the tested feedstocks, banana peel waste proved to be the most efficient, yielding approximately 76 μmol of H₂ after 170 min of reaction. Samples were collected before and after the photocatalytic process, and High-Performance Liquid Chromatography (HPLC) analysis indicated that the sugars consumed during the reaction were fructose and glucose. The results suggest that these sugars play a crucial role by acting as electron donors in the H₂ production process.

Acknowledgements

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