

**Le 14 mai 2025 à 11h00**

## **Conférence LG2A Amphithéâtre Peltier**

### **Sustainable Biomass-to-Energy Conversion: Choline Chloride-Based Deep Eutectic Solvents for Lignin Extraction and Liquefaction**

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#### Abstract :

Addressing current environmental challenges requires sustainable, long-term solutions—particularly in the transition toward greener energy sources. In this context, environmentally friendly solvents known as Deep Eutectic Solvents (DES), have emerged as promising green alternatives. This study explores the use of DES for the delignification of Empty Fruit Bunch (EFB) waste from the palm oil industry. DES, specifically a choline chloride–malic acid system, achieved 31.98% lignin removal in 4 hours and demonstrated high recyclability (93.8% and 91.1% recovery in the first and second cycles). Delignified EFB was further processed via hydrothermal liquefaction (HTL) under subcritical water and supercritical CO<sub>2</sub> conditions, optimizing at 275°C and 25 MPa. Bio-oil analysis revealed phenolic compounds as key products, highlighting a viable route for producing value-added lignin derivatives. Kinetic studies indicated a reaction rate increase from  $9.59 \times 10^{-4}$  to  $1.06 \times 10^{-3} \text{ s}^{-1}$  between 250–300°C, with an activation energy of 4.2 kJ/mol. The study demonstrates a sustainable biorefinery pathway for valorizing agro-industrial waste, promoting green solvents, and producing high-value phenolic compounds.

