# Single biomass pellet degradation during combustion : influence of raw elemental composition determined by LIBS

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**Date de la soutenance**

31/01/2024 à 13:30

**Lieu de la soutenance**

Salle de conférence du CORIA

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**Abstract**

The escalating global demand for energy and mounting environmental concerns have propelled the exploration of sustainable alternatives to conventional fuel sources. Biomass stands out as a promising renewable resource capable of alleviating the worldwide energy crisis while addressing environmental sustainability. This study delves into the combustion behavior of three distinct biomass: forest-derived wood, herbaceous miscanthus, and agricultural residue barley straw. By scrutinizing individual particle behavior during combustion, the research seeks to unravel the fundamental processes governing biomass conversion into energy and understand the unique combustion behaviors of different biomass sources. The complexity of biomass combustion, influenced by factors like chemical composition, elemental content, and combustion stages, lies at the heart of the investigation. Initial findings highlight potential catalytic effects of minor elements like sodium (Na) and potassium (K) on combustion behavior, prompting the need for in-depth studies to fully comprehend their influence. Through comprehensive characterization, the study identifies three critical combustion stages for biomass particles: humidity loss, devolatilization, and char oxidation, revealing significant distinctions in ignition points among the investigated biomass sources. The thesis aims to significantly contribute to understanding biomass-based energy generation and its environmental implications, providing a foundation for future advancements in biomass utilization, energy production, and sustainable practices