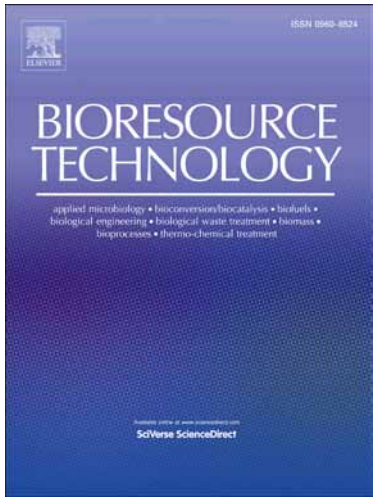

Combustion of Thermochemically Torrefied Sugar Cane Bagasse

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COMBUSTION OF THERMOCHEMICALLY TORREFIED SUGAR CANE BAGASSE

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Abstract

This study compared the upgrading of sugar bagasse by thermochemical and dry torrefaction methods and their corresponding combustion behavior relative to raw bagasse. The combustion reactivities were examined by non-isothermal thermogravimetric analysis. Thermochemical torrefaction was carried out by chemical pre-treatment of bagasse with acid followed by heating at 160-300°C in nitrogen environment, while dry torrefaction followed the same heating treatment without the chemical pretreatment. The results showed thermochemical torrefaction generated chars with combustion properties that are closer to various ranks of coal, thus making it more suitable for co-firing applications. Thermochemical torrefaction also induced greater densification of bagasse with a 335% rise in bulk density to 340 kg/m^3, increased HHV_{mass} and HHV_{volume}, greater charring and aromatization and storage stability. These features demonstrate the potential of thermochemical torrefaction in addressing the practical challenges in using biomass such as bagasse as fuel.