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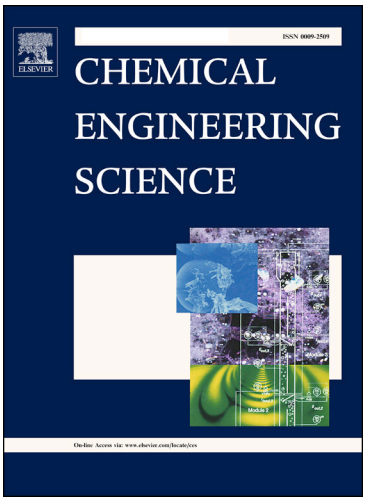

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Conversion of bio-char to CaC_2 at low temperatures - Morphology and kinetics

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ABSTRACT

The conversion of bio-char to CaC_2 is a potential way to achieve the production of high-value-added chemicals from biomass. The unique properties of bio-char, such as its fine particles, high activity, and low ash content, provide a high reaction rate, low reaction temperature, and high CaC_2 purity, which increase the feasibility of converting bio-char to CaC_2. This work investigates the morphological behaviors of the solid reactants and the products, as well as the reaction kinetics, in terms of changes in activation energy and the particle size of the reactants. The experiments were carried out using a thermal gravimetric analyzer coupled with a mass spectrometer (TG-MS) at temperatures lower than 1700 °C using corncob char and CaO as the starting materials. The TG-MS data and kinetics modeling show that at temperatures of 1400-1700 °C, the reaction of corncob char and CaO with a particle size of 22-114 μm is predominantly under reaction control, but

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