

Research on Biomass Gas Carbon CO Production Based on Ectopic Catalysis Pyrolysis Gas Cycle Self Activation

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Abstract

Traditional biomass pyrolysis technology suffers from problems such as difficult tar degradation, low quality of pyrolysis gas and severe pollution during activated carbon preparation. This paper innovatively proposes an ex-situ catalysis and circulating self-activation of pyrolysis gas coupled technology for co-production of biomass gas and carbon. Using giant reed as raw material, nickel-copper bimetallic catalyst is adopted to crack tar and upgrade pyrolysis gas, and the upgraded self-produced pyrolysis gas is used as the activation medium to prepare activated carbon. After optimizing the Ni-Cu/CaO catalyst and reaction parameters through experiments, the performance of products is greatly improved compared with the blank group. The volume fraction of hydrogen in pyrolysis gas increases from 3.9% to 36.5%, an increase of nearly 9 times. The as-prepared activated carbon possesses a specific surface area of 861.38 m²/g and a specific capacitance of 150 F/g at the current density of 0.5 A/g, with its pore structure and electrochemical properties significantly enhanced. This process requires no additional chemical reagents throughout the whole process. The high-value utilization of all biomass components is realized via the synergy of multiple reactions, which provides a new idea for the development of green technology for co-production of gas and carbon.

Keywords

Catalytic Cracking, Pyrolysis Gas Upgrading, Self-activation, Activated Carbon, Co-production of Biomass Gas and Carbon