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Thermochemical conversion of cobalt-loaded spent coffee grounds for production of energy resource and environmental catalyst

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ABSTRACT

Thermochemical conversion of cobalt (Co)-loaded lignin-rich spent coffee grounds (COSCG) was carried out to find the appropriate pyrolytic conditions (atmospheric gas and pyrolytic time) for syngas production (H_2 and CO) and fabricate Co-biochar catalyst (CBC) in one step. The use of CO_2 as atmospheric gas and 110-min pyrolytic time was optimal for generation of H_2 (~1.6 mole% in non-isothermal pyrolysis for 50 min) and CO (~4.7 mole% in isothermal pyrolysis for 60 min) during thermochemical process of COSCG. The physicochemical properties of CBC fabricated using optimized pyrolytic conditions for syngas production were scrutinized using various analytical instruments (FE-SEM, TEM, XRD, and XPS). The characterizations exhibited that the catalyst consisted of metallic Co

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