

# **Performance of Biochar Supported Multi-Metal Nano-Catalysts for Pyrolysis Tar Removal**

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## **Abstract**

The by-product tar produced in the biomass pyrolysis production process not only severely limits the efficiency of biomass resource utilization, but also has the risk of polluting the environment and endangering human health. This study uses activated biochar as a carrier to prepare multi-metal nanocatalysts for in-situ tar removal, which is of great significance for the further development of tar steam catalytic reforming technology and biomass pyrolysis gasification technology. In this study, a series of multi-component metal nanocatalysts were prepared by citric acid sol-gel method, and the steam catalytic reforming of tar model compound toluene and toluene/naphthalene/phenol mixture was investigated in a self-made two-stage biomass catalytic pyrolysis fixed bed reactor. performance. The effects of activation temperature and activation time on the physicochemical properties of biochar were investigated, and a series of multi-component metal nanocatalysts were prepared using activated biochar as a carrier. The effects of reaction temperature, promoter metals and their loadings on the steam catalytic reforming performance of tar model compound toluene were investigated. The anti-deactivation performance and mechanism of the modified binary metal nanocatalyst 6% Ni-4% Co/char were studied in depth from the service life, carbon deposition amount, reduction performance, and carbon deposition microstructure and types. The anti-deactivation performance and mechanism of catalysts were further studied.

**Keywords:** Biochar; Nanocatalyst; Tar; Steam Catalytic Reforming; Carbon deposition