

A one-step self-sustained low temperature carbonization of coconut shell biomass produced a high specific surface area biochar-derived nano-adsorbent

ABSTRACT

A one-step self-sustained carbonization of coconut shell biomass, carried out in a brick reactor at a relatively low temperature of 300–500°C, successfully produced a biochar-derived adsorbent with 308 m²/g surface area, 2 nm pore diameter, and 0.15 cm³/g total pore volume. The coconut shell biochar qualifies as a nano-adsorbent, supported by scanning electron microscope images, which showed well-developed nano-pores on the surface of the biochar structure, even though there was no separate activation process. This is the first report whereby coconut shell can be converted to biochar-derived nano-adsorbent at a low carbonization temperature, without the need of the activation process. This is superior to previous reports on biochar produced from oil palm empty fruit bunch.

Keyword: Biochar; Coconut shell; Carbonization; Nano-adsorbent; Biomass; Surface area