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Highly Porous Activated Carbon Materials from Carbonized Biomass with High CO_2 Capturing Capacity

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ABSTRACT

Activated carbon material is considered as a promising porous motif for the adsorption and storage applications. Activated carbon materials were prepared from biomass (gelatin and starch) by employing the dry chemical activation, possesing relatively high surface areas from (1636 - 1957 m^2 g^{-1}) and abundant micropores with a pore size ca. 1.95 nm. A remarkably high CO_2 adsorption (7.49 $mmol.g^{-1}$ at 0 ºC and 1 bar) for GSK1-700 was recorded, that might be attributed to the unique microstructure and introduction of oxygen and nitrogen functionalities by superficial treatment. ACs showed good ideal selectivities for CO_2/N_2 (52-98). The heat of adsorption was determined by CO_2 adsorption, while the morphology was observed by FE-SEM and F-TEM, and chemical compositions of the as-prepared activated carbons were analyzed via elemental analysis, XPS and FT-IR spectra.

Keywords: Porous carbons, CO_2 adsorption, Activated carbon, Biomass, Nitrogen content