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Review

Recent advances in biomass based activated carbon for carbon dioxide capture – A review

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ABSTRACT

Various conventional adsorbents such as metal–organic framework (MOF), zeolites, commercial activated carbon, activated alumina, and metal oxides are being used to capture carbon dioxide (CO_2) in pre-and post-combustion. Conventional adsorbents, however, have several shortcomings, including high cost, high energy requirements, and resource scarcity. Waste can be used as a precursor for activated carbon development, which has environmental and economic benefits. This review article aimed to explore the potential for agricultural waste to be converted into an activated carbon (AC) precursor for CO_2 adsorption. Properties and comparison of various biomass-based activated carbon for CO_2 adsorption have been discussed. Further, hybrid activated carbon-containing functional groups to improve the selectivity and adsorption efficiency of CO_2 are also reviewed and summarized. The effects of operating parameters, including types of activating agents, impregnation ratio and activation temperature, were also studied. The properties of AC were compared, such as compositional, surface area, microporous volume, functional groups and adsorption capacity. AC derived from waste materials has a high CO_2 uptake, comparable with commercial adsorbents. However, the selection of precursor and activation methods play essential roles in synthesizing of AC. In summary, biomass-based activated carbon is an attractive material to develop AC for carbon dioxide adsorption.
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