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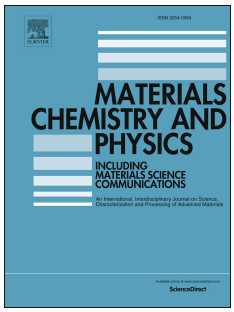

CO_2 adsorption on polyethylenimine-modified ZSM-5 zeolite synthesized from rice husk ash

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CO_2 adsorption on polyethylenimine-modified ZSM-5 zeolite synthesized from rice husk ash

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Abstract

Mesoporous ZSM-5 zeolite as the adsorbent supporting material was synthesised from rice husk ash (RHA), and then impregnated with polyethylenimine (PEI) for amine functional modification. A series of adsorbents (ZSM-5-PEI-X) with different PEI loading ratios were characterized by XRD, FTIR, TGA/DTG, nitrogen adsorption-desorption, SEM and EDX techniques. The measurement of the adsorption capacity at different temperatures was indicated that ZSM-5-PEI-30 had the highest adsorption capacity at 120 °C (1.96 mmol/g). The experimental data were fitted by adsorption kinetic models and isotherm models, indicated that fractional-order model and the Dual-site langmuir model can be used to describe the adsorption mechanism and predict the adsorption performance. The high CO_2 adsorption selectivity and regeneration stability suggested that this adsorbent is a potential candidate in the adsorption and separation of CO_2 in industrial flue gas.

Keywords: Rice husk ash, ZSM-5, Polyethylenimine (PEI), CO_2 adsorption

1. Introduction

Growing anthropogenic greenhouse gas emissions have increased the deterioration of the global climate and hindered the promotion of human ecological civilization construction. In order to mitigate the climate change crisis and respond to long-term risk impacts, global warming caused by greenhouse gas emissions should be limited to 2 °C in the 21st century relative to

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