RICE.R. CO2: Raw Materials from Rice Husk to Capture CO2

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Carbon dioxide is the most important greenhouse gas emitted by human activities and its quantity is constantly growing. 20% of rice production results to be waste and its ashes are rich in silica. This project looks for new strategies to capture carbon dioxide, using rice husk, a local waste raw material. Rice waste was first treated with three different acids (HCl, H2SO4 and HNO3) in order to purify it. The combustion of rice waste was carried out at 500, 600 and 700°C for 3h and 6h, in the presence of air or in a modified atmosphere. The silica contained in the ashes was functionalized with monoethylamine, diethylamine or polyethylenimine branched (PEI) at 5, 10, 15, 20 and 25% w/w. Known quantities of CO2 were sent onto the samples, and we studied the processes of physisorption and chemisorption by FTIR spectrophotometry. CO2 absorption occurs in the region between 2400 and 2200 cm^{-1}, while the processes of CO2 chemisorption give a signal in the region between 1800 and 1400 cm^{-1}. The operating parameters that provided the best CO2 absorption were: pre-treatment of rice husk with HCl, combustion at 700°C for 6 hours and functionalization with polyethylenimine branched. The transformation of rice husk ashes, a local waste by product, into CO2 absorbing materials is feasible. Among the tested conditions, the best results were obtained with samples treated with polyethylenimine branched.

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