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, H_2SO_4 and HNO_3) 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. CO_2 absorption occurs in the region between 2400 and 2200 cm^{-1}, while the processes of CO_2 chemisorption give a signal in the region between 1800 and 1400 cm^{-1}. The operating parameters that provided the best CO_2 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 CO_2 absorbing materials is feasible. Among the tested conditions, the best results were obtained with samples treated with polyethylenimine branched.