

Effects of cold plasma treatment on sugarcane bagasse

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Sugarcane bagasse (SB) is the largest waste generated in the sugar industry, which has physical and chemical characteristics that allow its reuse [1]. Different studies have found its potential as a bioadsorbent for the removal of heavy metals in aqueous solutions [2, 3]. However, to improve its adsorption capacity it is necessary to subject it to some physical-chemical processes, which have had some limitations such as longer treatment times or generation of chemical residues. For this reason, plasma technology is a novel, high efficient and environmental-friendly physical technique that could be used to modify the surface of that materials [4]. In this study, SB biomass was treated in a cold plasma reactor using SF₆ as working gas. Three treatment times were studied (2, 30 and 60 min) with fixed power of 80 W and a work pressure of 16 Pa. The effects of the modifications were evaluated by three techniques: Fourier Transform Infrared (FTIR), Scanning electron microscopy SEM/ Energy dispersive X-ray spectroscopy (EDS), and X-ray photoelectron spectroscopy (XPS). The SEM results show alterations in the bagasse structures, mainly related to the increase of micropores while EDS results show that fluorine was incorporated into the material. There is no evidence of sulfur in the sample. In conclusion, this work demonstrated that cold plasma treatment generates some modifications in the physical and chemical properties of sugarcane bagasse, which could influence the adsorption process of heavy metals.

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