

Bioresource Technology

Structural characterisation of pretreated solids from flow-through liquid hot water treatment of sugarcane bagasse in a fixed-bed reactor

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Abstract

Untreated sugarcane bagasse and sugarcane bagasse pretreated with flow-through liquid hot water (LHW) treatment (170-207°C and 204-250 ml/min) in a fixed-bed reactor have been structurally characterised. Field emission gun scanning electron microscopy (FEG-SEM) and transmission electron microscopy (TEM) were used to investigate changes in the residues, in particular due to the fate of lignin. FEG-SEM results show that the LHW treatment modified the surface morphology of the pretreated bagasse with lignin droplets being observed on the fibre surface. TEM showed an increase in the plant cell wall porosity and lignin migration across the plant cell wall. Increases in pretreatment temperature were observed to increase the average size and density of lignin droplets on the fibre surface. The results provide evidence that for LHW flow-through treatment, just as for batch treatment, lignin repolymerisation and deposition on the surface of pretreated sugarcane bagasse is an important consideration.