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Surface Lignin Change Pertaining to the Integrated Process of Dilute Acid Pre-extraction and Mechanical Refining of Poplar Wood Chips and its Impact on Enzymatic Hydrolysis

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1 **Surface Lignin Change Pertaining to the Integrated Process of Dilute**
2 **Acid Pre-extraction and Mechanical Refining of Poplar Wood Chips**
3 **and its Impact on Enzymatic Hydrolysis**

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9 **Abstract**

10 Dilute acid pre-extraction enhanced the mechanically refined poplar pulp substrates'
11 enzymatic hydrolysis efficiency obviously. The results showed that the surface lignin
12 distribution was changed significantly in residual wood chips and pulp substrates, and
13 the surface lignin distribution showed important impact on the following enzymatic
14 hydrolysis. Acid pre-extraction can lead to a redistribution of lignin in fiber cell walls,
15 i.e., the lignin was degraded and migrated to fiber surface in the form of re-deposited
16 lignin and pseudo-lignin. However, higher pre-extraction intensity was not desired due
17 to the formation of redeposited lignin and pseudo-lignin. This study will help to reach a
18 deeper understanding on the lignin distribution in the view of molecular and
19 ultrastructure, and promote the development of a cost-efficient pretreatment strategy
20 for biomass processing.

21 **Keywords:** dilute acid pre-extraction, mechanical refining, surface lignin
22 concentration, redistribution, enzymatic hydrolysis

23 **1. Introduction**

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