



## Novel carbon-rich additives preparation by degradative solvent extraction of biomass wastes for coke-making



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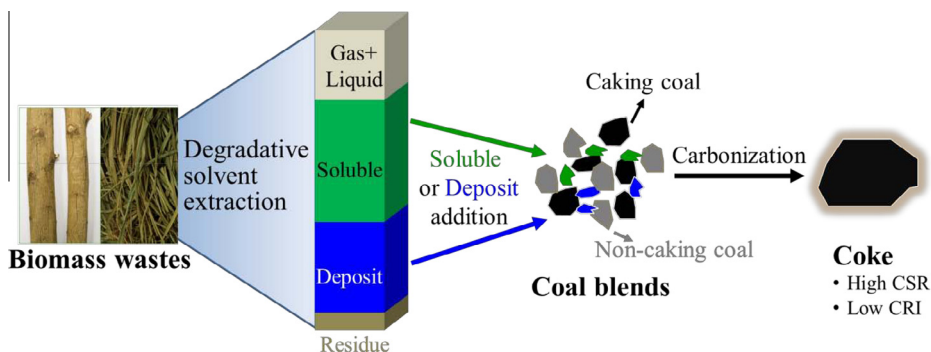
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### HIGHLIGHTS

- Soluble and Deposit were produced by degradative solvent extraction of biomass.
- Soluble and Deposit had good thermoplastic properties.
- Adding Soluble and Deposit into coke-making coal improved its thermoplastic properties.
- The addition of Deposit or Soluble markedly enhanced the coke quality.
- Soluble and Deposit were proved to be good additives for coke-making.

### GRAPHICAL ABSTRACT

Using Soluble and Deposit prepared from biomass as additives for cokemaking.



### ARTICLE INFO

#### Article history:

Received 16 January 2016

Received in revised form 25 January 2016

Accepted 27 January 2016

Available online 2 February 2016

#### Keywords:

Degradative solvent extraction

Biomass

Additives

Thermoplasticity

Coke-making

### ABSTRACT

In this work, two extracts (Soluble and Deposit) were produced by degradative solvent extraction of biomass wastes from 250 to 350 °C. The feasibilities of using Soluble and Deposit as additives for coke-making were investigated for the first time. The Soluble and Deposit, having significantly higher carbon content, lower oxygen content and extremely lower ash content than raw biomasses. All Solubles and most of Deposits can melt completely at the temperature ranged from 80 to 120 °C and 140 to 180 °C, respectively. The additions of Soluble or Deposit into the coke-making coal significantly improved their thermoplastic properties with as high as 9 °C increase of the plastic range. Furthermore, the addition of Deposit or Soluble also markedly enhanced the coke quality through increasing coke strength after reaction (CSR) and reducing coke reactivity index (CRI). Therefore, the Soluble and Deposit were proved to be good additives for coke-making.

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### 1. Introduction

Coke is an essential industrial material in iron and steel industry, which acts as the important roles of carbon skeleton, main fuel, reducing agent in blast furnace (Hutny et al., 1991). The coking

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