

The Critical Role of Lignin in Biomass Conversion

Background

- Lignin has been considered as a crucial recalcitrance component in biomass utilization.
- An in-depth understanding of lignin properties and their influences on biomass conversion can facilitate improved biomass utilization and lignin valorization to increase the economic viability of biorefinery.

Approach

- The current understanding on lignin-related biomass characteristics, the impact of lignin on the biological conversion of biomass, and recent lignin-targeting pretreatment strategies is reviewed.
- The desired lignin properties in biorefinery and future pretreatment strategies are discussed.

Outcome

- Effective lignin fractionation is necessary to have sufficient feedstock for the following valorization processes.
- Undesired reactions (condensation) of lignin can negatively influence on the selectivity of lignin-derived fuels and chemicals.
- Minimal modification of lignin structure during the pretreatment is ideal for the effective utilization of the fractionated lignin as polymers.
- Easy separation of lignin is crucial to the development of economically feasible lignin valorization strategies.

Significance

- This review comprehensively describes key lignin-related characteristics affecting the biomass recalcitrance and the critical role of lignin in biomass conversion.

<i>Lignin characteristics</i>	<i>Correlations with biomass conversion</i>
<i>Lignin content</i>	<i>Negative</i>
<i>Lignin composition</i>	<i>Variable</i>
<i>Hydroxycinnamates</i>	<i>Negative</i>
<i>Interunit linkages</i>	<i>Positive (β-O-4); Negative (β-5)</i>
<i>Hydroxyl group</i>	<i>Positive (Aliphatic/Total OH); Negative (Phenolic OH)</i>
<i>Pseudo lignin</i>	<i>Negative</i>
<i>Molecular weights</i>	<i>Variable</i>

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