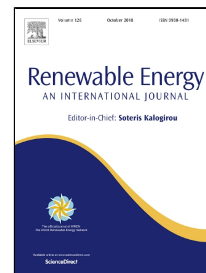


# Accepted Manuscript

Key issues in modeling and optimization of lignocellulosic biomass fermentative conversion to gaseous biofuels

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1 **Key issues in modeling and optimization of lignocellulosic biomass fermentative**  
2 **conversion to gaseous biofuels**

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8 **Abstract**

9 The industrial-scale production of lignocellulosic-based biofuels from biomass is expected to  
10 benefit society and the environment. The main pathways of residues processing include  
11 advanced hydrolysis and fermentation, pyrolysis, gasification, chemical synthesis and  
12 biological processes. The products of such treatment are second generation biofuels. The  
13 degree of fermentation of organic substances depends primarily on their composition and  
14 chemical structure. Optimization of fermentation conditions leads to better understanding of  
15 occurring processes. Therefore, an overview of recent developments in fermentation modeling  
16 is necessary to establish process parameters enabling high yields of biofuels production.  
17 Among process parameters affecting the yield and rate of biogas and biohydrogen, pH of the  
18 pulp, temperature, composition, biomass pre-treatment and digestion time are to be  
19 considered. The technology of anaerobic co-digestion has been intensively developed as a  
20 valuable solution for the disposal of organic wastes and sewage sludge. Modeling of biogas  
21 production from lignocellulosic biomass has been intensively investigated and is well  
22 described by adapted ADM1 model. Modeling of fermentative hydrogen production lacks a  
23 kinetic model incorporating process parameters with the view of pretreatment and  
24 fermentation. This paper presents the state-of-the-art on the problems related to  
25 lignocellulosic biomass pre-treatment and discusses the mechanisms of lignocellulosics  
26 conversion to gaseous biofuels.

27 **Keywords:** *lignocellulosic biomass, biomass conversion, biogas, biohydrogen, kinetic*  
28 *models, empirical models*

29

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