



## Membrane-assisted separation of microbial gaseous fuels from renewable sources

A. Netrusov<sup>a\*</sup>, S. Abramov<sup>a</sup>, E. Sadraddinova<sup>a</sup>, A. Shestakov<sup>a</sup>, M. Shalygin<sup>b</sup>, V. Teplyakov<sup>b</sup>

<sup>a</sup>Microbiology Department, Moscow State University, Moscow 119992, Russia

Tel. +7 (495) 939 2763; Fax +7 (495) 939 2763; email: anetrusov@mail.ru

<sup>b</sup>A.V. Topchiev Institute of Petrochemical Synthesis, Russian Academy of Science, Moscow 119991, Russia

Received 31 July 2009; Accepted 22 December 2009

---

### ABSTRACT

One possible way to obtain fuel gases is using of bioreactors running on cellulose and producing H<sub>2</sub>/CO<sub>2</sub> gas mixtures. This method has many advantages, for example: high ecological efficiency, utilization of organic wastes, low energy consumption, accessibility and simplicity of hardware implementation. The results of cellulose bioconversion into hydrogen by using an active membrane, system integrated with anaerobic thermophilic bioreactors, are presented. The suggested membrane system includes anaerobic hydrogen bioreactor and membrane module. Fermentation broth with dissolved gases was transferred into membrane module, where gases were separated from fermentation broth with its circulation back into anaerobic bioreactor. The developed system helps to obtain energy from organic substrates in the form of pure combustible gas (H<sub>2</sub>).

*Keywords:* Membrane module; Gas isolation; Anaerobic bioreactor; Thermophilic cellulose decomposition; Hydrogen

---

\* Corresponding author.