

“SIMULTANEOUS BIOHYDROGEN PRODUCTION AND WASTEWATER TREATMENT BY SELECTIVELY ENRICHED ANAEROBIC MIXED MICROBIAL CONSORTIUM” (BIOSIM)

Goal of the project:

- Developing a selectively enriched anaerobic mixed microbial consortium able to metabolize complex, dynamic, unsterile substrates like wastewaters resulting significant amount of biohydrogen;
- Increasing the hydrogen production yield by optimizing the various physico-chemical parameters that influence the biohydrogen production process;
- Developing a novel biohydrogen production technology, in order to replace the existing methane production phase used in wastewater treatment plants.

Short description of the project:

- Developing a microbial consortium able to metabolize organic substrates with biohydrogen production

Implementation period:

01.09.2012 - 15.12.2016

Project implemented by

- CO - University of Politehnica Timisoara,
- P1 - University of Agricultural Sciences and Veterinary Medicine of Banat “King Mihai I” Timisoara,
- P2 - National Research Institute of Development in Electrochemistry and Condensed Matter Timisoara.

Main activities:

Main activities of BIOSIM proposal were:

- Establishing an anaerobic mixed consortia capable of wastewater treatment with simultaneous biohydrogen production;
- Determining the influence of different physic-chemical factors influencing wastewater treatment with simultaneous biohydrogen production and process optimization;
- Mathematical modeling of the biohydrogen production process with the development of a novel microbiological wastewater monitoring system and design of a test fuel cell system for the energy conversion of the produced biohydrogen.

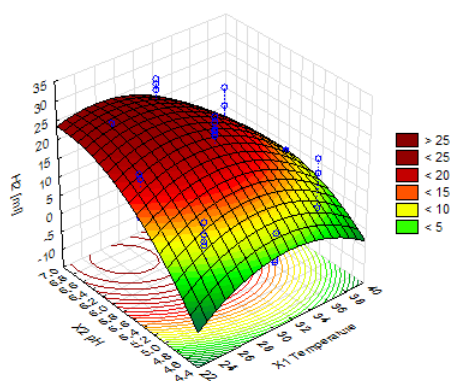


Results:

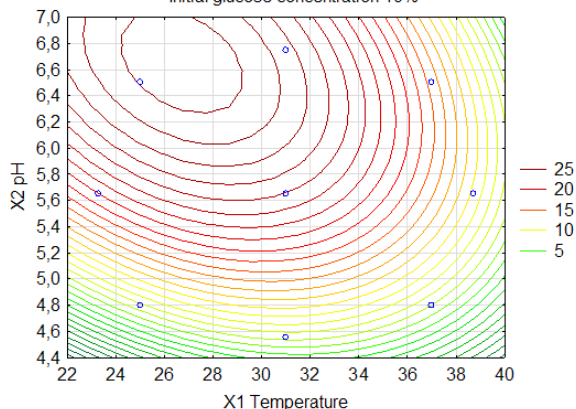
Main results of BIOSIM proposal were:

1. Establishing the ideal starting inoculum capable of wastewater treatment with simultaneous biohydrogen production;
2. Design and optimization of the wastewater treatment process in order to increase the biohydrogen yield;
3. Development of a novel microbiological wastewater monitoring system and development of a logistics system model.
4. Wide-scale dissemination of the project's results, materialized through 22 articles with an impact factor to 25.

Initial glucose concentration 10%



Initial glucose concentration 10%



Applicability and transferability of the results:

BIO-SIM proposal combine novel high tech genomic approaches with the appropriate pretreatment of wastewaters in order to enhance hydrogen gas evolution efficiency in wastewater plants. Important efficiency increasing factor is the re-utilization effort (carbon mobilization) of the otherwise byproduct anaerobic sludge coming out from the bioconversion process.

Our technology makes possible the determination of the rate of the bacterial participants in the consortium. These information provide guidelines for the proper adjustment of the conditions in each step of biohydrogen formation process.

Financed through/by

Executive Unit for Financing Education, Research, Development and Innovation (UEFISCDI)

Research Center

ICER Politehnica Timisoara

Research team

A. CO - University of Politehnica Timisoara

1. Dr. Gergely MARÓTI – project director
2. Ş.I. Dr. Vasile GHERMAN –UPT team leader
3. Prof. Dr. Ing. Francisc PETER
4. Sl. Dr. Ing. Narcis Mihai DUŢEANU
5. S.I.Dr.Ing. Cristian-Marius STĂNILOIU-THEIS
6. Conf.Dr.Ing. Constantin FLORESCU
7. S.I.Dr.Ing. Mariana ILIE
8. Ş.I. Dr. Ing. Adina NEGREA
9. Dr. Iulian BOBOESCU
10. Dr. Gabriela GHERMAN
11. Drd. Paul MOLNAR.

B. P1 - University of Agricultural Sciences and Veterinary Medicine of Banat "King Mihai I" Timisoara:

1. Ş.I. Dr. ing. Teodor VINTILĂ – P1 team leader
2. Dr. ing. Nicolae POPA
3. Dr. ing. Daniela VINTILĂ
4. Ing. Dumitru POPESCU
5. Ec. Victoria PĂRVA
6. Ec. Cornelia CHEŢ

C. P2 - National Research Institute of Development in Electrochemistry and Condensed Matter Timisoara:

1. Dr.Fiz. Paula SFARLOAGA - P2 team leader
2. Dr.Fiz. Ioan GROZESCU
3. Dr. Ştefan NOVACONI
4. Dr.Chim. Paulina VLAZAN
5. Dr. Anamaria DABICI
6. Th. Ioan PATEANU
7. Th. Radu GURGU
8. Drd. Fiz. Daniel DAMIAN
9. Mioara ONEA

Contact information

Prof. Gergely Maroti, PhD
 Faculty of Civil Engineering /Department of Hydrotechnics
 Address: Str. George Enescu, No. 1A Postal Code 300022, Timisoara
 Phone: (+40) 256 404118
 Mobile: 0763684710
 E-mail: vasile.gherman@upt.ro