

CNR IRET Conference

Rome, February 18th-19th 2025

Biohydrogen production by immobilized photosynthetic microorganisms

FOSSIL FUELS

Finite in supply, cause land degradation and release of greenhouse gases and pollutants.

BIOLOGICAL H₂

produced by photosynthetic microorganisms:

- Environmentally friendly properties
- Achievement of carbon neutrality
- Extremely combustible
- Its combustion yields only water as byproduct

Among the strategies that could be explored to improve biological H_2 production efficiency, the immobilization of cells could be particularly effective.

Immobilization process

Increase:

- Product recovery, cell harvesting, medium replacement
- Volumetric cell density
- Homogeneous distribution of cells
- Light conversion efficiency
- Cells' resistance to various environmental stresses

Cells **immobilized** in 2% w/v calcium alginate

Rhodopseudomonas palustris
– Purple non sulfur bacterium –
Cylindrical 220 mL photobioreactor

Chlorella vulgaris – Microalgae – Flat 600 mL photobioreactor



GC analysis of the gas produced by the culture (PerkinElmer Clarus 500)

The ability of the immobilized cells to produce H₂ in two photobioreactors was tested Further research is necessary to improve the industrial and commercial feasibility of H₂ production by photosynthetic microorganisms

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