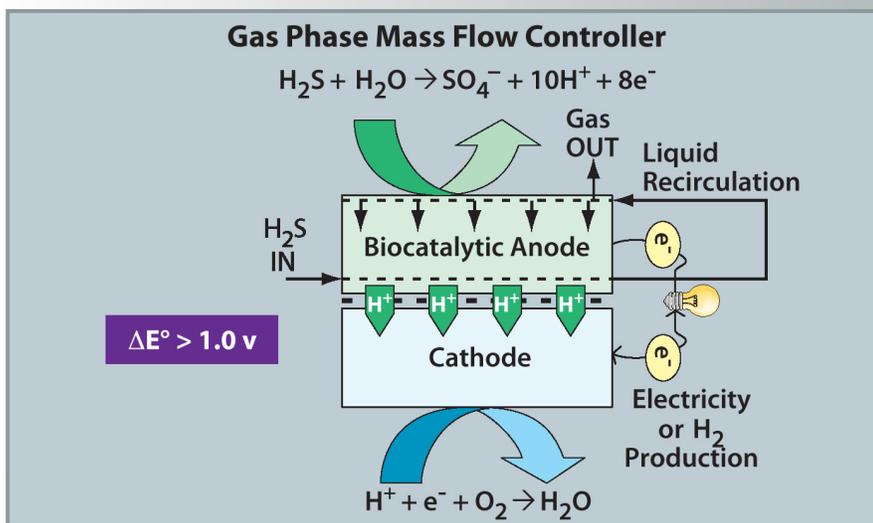


# Bioelectrochemical Treatment of Gaseous By-products

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## Technology Summary

A new method for using gaseous compounds to produce energy, while also removing harmful by-products, was invented by ORNL researchers. This invention offers an efficient use of waste products, such as sulfurous compounds or carbon monoxide, and can reduce the overall cost of industrial operations.

Industrial processes often output gas by-products that are either processed as waste or directly released into the environment. These outputs are both a financial and an environmental liability. This invention addresses both issues by producing energy on site that can be used for fuel refining, biomass processing, or other production or waste treatment needs. Environmental outputs are significantly reduced, and any remaining waste products contain a reduced quantity of harmful compounds.

The invention uses microbes in a bioelectrochemical system to treat gas streams. The microbes are capable of oxidatively degrading the gas compounds while also producing electrical energy or hydrogen. A proton-conducting medium supports the movement of protons during these processes from the anode to the cathode. To use the device for electricity production, the anode is in electrical communication with the device's cathode.

## Advantages

- Reduces the costs associated with removal of hydrogen sulfide or carbon monoxide
- Produces electricity or hydrogen
- Electricity or hydrogen can be reused for hydrotreatment processes
- Operates by renewable means

## Potential Applications

- Treatment of sulfide-containing gas streams
- Treatment of carbon monoxide-containing gas streams
- Petroleum refining
- Syngas to bioenergy conversion
- Other industrial operations where hydrogen sulfide or carbon monoxide is a by-product

## Patent

Abhijeet P. Borole, *Bioelectrochemical Treatment of Gaseous By-products*, U.S. Patent 12/628,282, filed December 1, 2009.

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