



Overview of a Fuel Cell

Technology Summary

Microbial fuel cells (MFCs) and microbial electrolysis cells (MECs) are used in the production of hydrogen and electricity respectively. The proposed invention consists of designs for cathodes in MFCs and MECs that provide quality performance for these systems using lower-cost materials. This design utilizes metals, such as stainless steel, as the current collector of the cathode. The brush or mesh cathode, composed of stainless steel, nickel, or titanium, can be used in high-surface area configurations. Stainless steel performance at the cathode can be further enhanced by the use of nickel oxides deposited onto the metal surface by electrochemical deposition in order to increase catalytic efficiency.

Application & Market Utility

Performance of current MECs and MFCs are limited by the cathode, which require expensive materials such as platinum. The disclosed invention replaces the use of these expensive materials with stainless steel and other affordable metals. The performance is then enhanced by the use of nickel oxides.

Next Steps

Demonstrated hydrogen production can be achieved without expensive materials; now seeking licensing opportunities.

TECHNOLOGY READINESS LEVEL

4-7

Seeking

Licensing |

Keywords

- Brush electrode
- hydrogen
- nickel cathode
- MFC
- MEC

Researchers

Bruce Logan

Kappe Professor of Environmental Engineering
Evan Pugh University Professor in Engineering

[Online Bio](#)

[Website](#)

Douglas Call

Graduate Student Researcher

Matthew Merrill

Graduate Student Researcher

Other Researchers

Shaoan Cheng

Originating College

College of Engineering

Office of Technology Management Contact

Swope, Bradley
bas101@psu.edu
814-863-5987