

***Generation of Bioenergy from Solid Agricultural Wastes  
with Novel Microbial Fuel Cell Technology***



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**Abstract:**

The agricultural residues (e.g., corn stover) have high energy content in the form of reduced organic compounds such as cellulose and lignin. Microbial fuel cells (MFCs) have tremendous potential for recovering this energy and converting it directly to electrical energy. However, the challenges associated with achieving hydrolysis of cellulose in untreated solid biomass preclude electricity generation from cellulose biomass in MFCs. In the proposed research, a new type of MFCs will be developed so that forages and crops can be used as alternative feedstock for bioenergy generation via solid-state fermentation. To ensure the presence of an active cellulose-degrading population, rumen fluid will be added to the solid-state fermentation MFC. The addition of limestone (e.g., calcium carbonate) will provide buffering capacity to sustain fermentation processes and enhance proton transfer. Successful promotion of using agriculture plant residues for low-cost bioenergy production may have profound impacts on the U.S. agriculture, energy security, environment, and globe competitiveness.