OUTPUT POWER OPTIMIZATION OF MICROBIAL FUEL CELLS BY SCALABLE MICROFLUIDIC DEVICES

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Abstract: The purpose of this research is to determine if microfluidic technology can be used as a renewable energy application to determine optimization for increased power of Benthic Microbial Fuel Cells (BMFC). A microfluidic chip based BMFC was designed to evaluate bacterial electricity at microscale distances. The system could be used to optimize biological parameters, geometry, and electrode scaling towards increased power. The polydimethylsiloxane (PDMS) chip is built using elastomer microfluidics to provide biologically-inert microfluidic confinement of the bacteria. The microelectrode matrix patterned onto glass substrate is based on the binary fractal H-architecture, which captures the charge without location bias and conducts it to the outside circuit. The results show up to ~120 mW/m^2 average power output density, non-optimized. This encouraging output shows that this device and associated technique are a major step forward for renewable power systems for maritime environments and demonstrates that microfluidics can be considered for power production. This can become a standardized test platform for future MFC research and optimized for power production. Once optimized, one chip can serve as a unit device in an array comprising a large-scale renewable power source and integrate continuous or periodic food sources.

TERRAIN CATEGORIZATION CAPABILITIES OF LIDAR SYSTEMS OVER DENSELY VEGETATED AREA

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Abstract: LiDAR system is a technology which can fulfil various needs. The surveying tasks are one of the applications for which LiDAR can be applied. This study intends to continue working on the previous study of Andrew S. Davis, who conducted the study of "Forestry Identification with LiDAR Waveform and Point Clouds." The study aims to evaluate classification capability of LiDAR system over various tree species. The collection of sample data was collected over Point Lobos State Park, California. Dataset were separated into two categories, aerial platform and ground surveying. The aerial platform obtains from Optech Titan system and Airborne Hydrography AB Chiroptera system (AHAB). The analysis was performed by comparing the results from ENVI software classifier and actual location of tree species from ground
surveying. The study also extracted the feature of waveform of each tree species which are used to distinguish them among samples of tree species and their surrounding environment; such as road and trail. The classifications were done by the classifier tools provided on ENVI (K-means, SAM, and SVM). The results show that the waveform data can achieve distinguish class samples. The analysis can point out the error most occurred between the closed class.