

75e Biocarbon Fuel Cell

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We investigated the electrochemical reactivity of biocarbon. As a pretreatment, we carbonized Flash CarbonizationTM charcoal at 950 degrees C for 30 min, which caused a reduction of its electrical resistivity. Then we compressed the charcoal at about 10 MPa to form a carbon bed and used it as an anode electrode. The charcoal anode showed low resistivities of $\sim 0.1 \Omega\text{cm}$, which was comparable to the resistivity of graphite electrodes. We used a Ni tube/Ag mesh/Pt foil assembly as a cathode (oxygen reduction) and 6 M KOH solution as an electrolyte. At 80 degrees C and 0.1 MPa, the observed EMF (open circuit voltage) was 0.20 V. We also investigated the decrease in voltage while increasing the current applied to the anode and cathode. The limiting current was 5.5 mA and the maximum wattage was 0.24 mW. To improve its performance, the fuel cell apparatus was operated in a pressure vessel. The reasons for the operation in the pressure vessel were: 1) to operate the system at temperatures above 100 degrees C and 2) to increase the concentration of dissolved oxygen in the electrolyte. The results at elevated pressures will be presented in the meeting.