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DMFC with Hydrogen Peroxide Cogeneration

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Abstract

The process of H_2O_2 generation in the direct methanol fuel cell (DMFC) composed of the "Black Pearls 2000" gas-diffusion cathode, washed by sodium chloride brine or sea water for O_2 electroreduction and the half-membrane-electrode assembly with the Nafion 115 cation-exchange membrane, hot-pressed on one side with the carbonaceous gas-diffusion anode impregnated by Pt/Ru catalyst for methanol oxidation, has been developed. The effect of NaCl concentration in the catholyte, methanol and the KOH concentration in the anolyte, electrolyte temperature, and circulation flow rate on the generated cell voltage, current, and H_2O_2 current efficiency have been

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studied in 2 h trials. An 87–95% current efficiency for H_2O_2 generation with a $5.286 - 9.44\ \mathrm{mg\ h^{-1}\ cm^{-2}}$ rate and at $15\ \mathrm{mA\ cm^{-2}}$ current density was achieved in the DMFC with 1 M CH_3OH + 7 M KOH in the anolyte and $30\ \mathrm{g\ L^{-1}}$ NaCl in the catholyte.

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