METHANOL TOLERANT CATHODES FOR FUEL CELLS

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Abstract.

This paper reports the fabrication and characterisation of a range of methanol tolerant electrodes for use in the direct methanol fuel cell. Cyclic voltammetry and steady state polarisation data of the oxygen reduction cathodes in the presence and absence of methanol is reported. Such electrodes offer exciting opportunities for future development of methanol fuel cell technology.

Introduction.

One of the major problems, limiting further improvements of the direct methanol fuel cells (DMFC), is the crossover of methanol through the polymer electrolyte membrane to platinum based cathodes. This results in a mixed and depolarised cathode potential, [1-3] reduction of cell power and conversion losses due to lost fuel. For simultaneous reduction of oxygen and fuel oxidation not to occur at the cathode requires electrode materials selective to oxygen reduction. [3-5] High cell efficiency and simple cell and cell stack designs can be achieved via this approach.

Results

In this work, several methanol tolerant cathodes were fabricated and characterised, e.g., Ru (Fig. 1). These cathodes were tested for oxygen reduction in the presence of methanol. Among the materials, ruthenium showed a high methanol tolerance, as presented in figure 2.

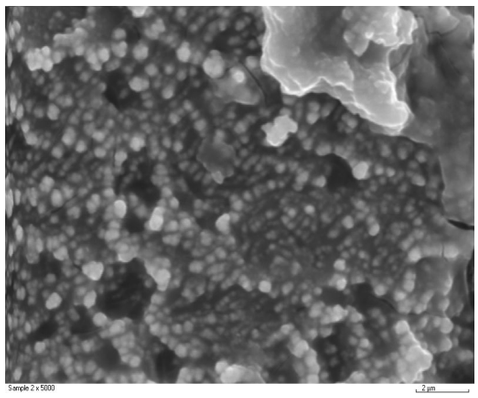

Figure 1. Scanning electron micrograph

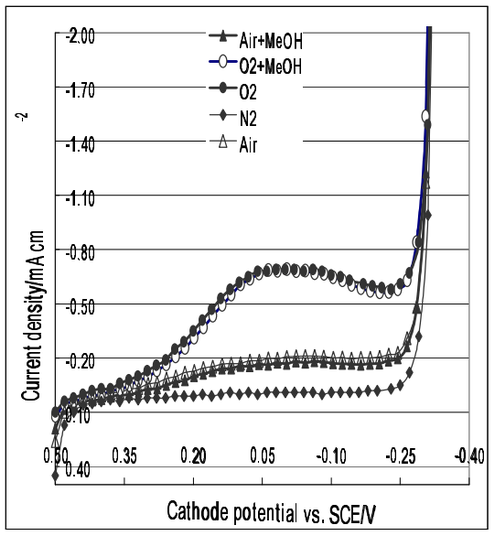

Figure 2. Linear sweep voltammograms of the Ru (1.5 mg Ru cm^{-2})/Substrate A for O_2 reduction at the ruthenium cathode (x5000). ; scan rate of 5 mV/s.

References

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