A channel flow cell with double disk electrodes for O_2 electroreduction study at elevated temperature and elevated pressure: Theory

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Abstract

A new double-disk-electrode channel flow cell (DDECFC) has been designed, constructed and tested. A theoretical treatment and implicit finite difference numerical simulations are presented, which permit the computation of the hydrodynamic behavior of this cell under steady state conditions, i.e. the diffusion limited current of the working electrode and the collection efficiency of the detector. The simulated results are consistent with those measured experimentally, indicating that our simulations appropriately describe the hydrodynamic behavior of this cell. The oxygen reduction reaction (ORR) on a carbon supported nanoparticle Pt catalyst was preliminarily studied with this cell.

Keywords: Double-disk-electrode channel flow cell, hydrodynamics, collection efficiency, numerical simulations, oxygen reduction reaction

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