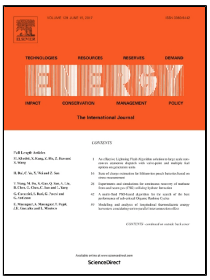
Accepted Manuscript



Modeling of passive direct ethanol fuel cells

V.B. Oliveira, J.P. Pereira, A.M.F.R. Pinto

PII:	S0360-5442(17)30937-4
DOI:	10.1016/j.energy.2017.05.152
Reference:	EGY 10960
To appear in:	*Energy*
Received Date:	06 June 2016
Revised Date:	18 May 2017
Accepted Date:	25 May 2017

Please cite this article as: V.B. Oliveira, J.P. Pereira, A.M.F.R. Pinto, Modeling of passive direct ethanol fuel cells, *Energy* (2017), doi: 10.1016/j.energy.2017.05.152

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Modeling of passive direct ethanol fuel cells

V.B. Oliveira[a]*, J.P. Pereira[b], A.M.F.R. Pinto[a]*

[a]CEFT, Department of Chemical Engineering, Faculdade de Engenharia da Universidade do Porto, Porto, Portugal

[b]TU Delft / Department of Biotechnology, BC Delft, The Netherlands

*corresponding author: apinto@fe.up.pt and vaniaso@fe.up.pt

ABSTRACT

Direct ethanol fuel cells (DEFCs) are promising substitute power sources for compact and mobile applications. Passive feed systems are especially desirable because they are less expensive, more compact and simpler than the active systems. Aiming for the introduction of passive DEFCs in the market, this work describes a steady-state and one-dimensional model considering the electrochemical reactions and all the transport phenomena (heat and mass transport) occurring in a passive feed DEFC. This model can be used to estimate the concentration profiles of the different chemical species, as well as, the temperature distribution on the different layers. Moreover, the model can accurately predict the influence of the operating conditions and design parameters on the ethanol and water crossover rate. The model predictions for the polarization curves are successfully compared with recent published data for different ethanol concentrations. The current model is rapidly implemented and can be a useful tool to optimize the performance of a passive DEFC.

Keywords: passive direct ethanol fuel cell, modeling, ethanol crossover, water crossover, fuel cell performance

1. Introduction

In the last decades fuel cells received great attention as a promising substitute power source for compact and mobile applications, mainly due to their simplicity, efficiency, low level of emissions and quick refueling [1,2]. Among them, the direct fuel cells (DFC) which use a liquid as fuel, such as methanol and ethanol, appear as one of the most

Download English Version:

https://daneshyari.com/en/article/5476587

Download Persian Version:

https://daneshyari.com/article/5476587

Daneshyari.com