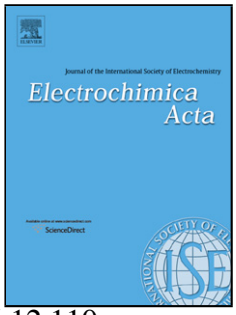


Title: Transient analysis of a Direct Methanol fuel cell anode

Author: Sai Darshan Adloor Balaji Krishnamurthy

PII: S0013-4686(15)31035-5
DOI: http://dx.doi.org/doi:10.1016/j.electacta.2015.12.110
Reference: EA 26259

To appear in: *Electrochimica Acta*

Received date: 12-10-2015
Revised date: 19-11-2015
Accepted date: 15-12-2015

Please cite this article as: Sai Darshan Adloor, Balaji Krishnamurthy, Transient analysis of a Direct Methanol fuel cell anode, Electrochimica Acta http://dx.doi.org/10.1016/j.electacta.2015.12.110

# Transient analysis of a Direct Methanol fuel cell anode

**Sai Darshan Adloor and Balaji Krishnamurthy*,**

**Department of Chemical Engineering,**

**BITS Pilani, Hyderabad 500078, India.**

**Abstract:**

A mathematical model has been developed to study the transient analysis of the methanol oxidation process on the anode of a Direct Methanol fuel cell. The model has been developed using first principles equations to study the concentration profiles of methanol across the anode backing layer, anode catalyst layer and the membrane. Model results indicate that the kinetics of the methanol oxidation process in the anode catalyst layer plays a more important role than the diffusion process in deciding the concentration profiles across the anode backing layer/anode catalyst layer and membrane. Model results indicate that both the temperature and methanol concentration play an important role in determining cell current density. Simulation results also indicate that the potential drop across the membrane plays a negligible role in determining cell current density. Model results are compared with experimental anode overpotential curves and cell polarization curves and are found to compare very well with experimental data.

Key words: methanol crossover, overpotential, membrane, concentration.

*-Contact info: balaji.krishb1@gmail.com, Ph: 091 40 66303552.

## 9. Nomenclature:

$T$ = Absolute temperature, K

*ABL* = Anode Backing Layer

*ACL* = Anode Catalyst Layer

$\eta_A$ = Anode over-potential, V