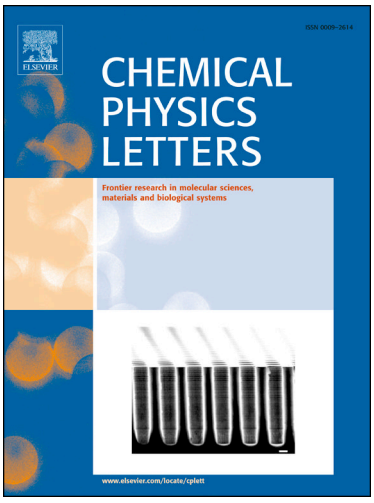

Research paper

Transport equations in an enzymatic glucose fuel cell

Soham Jariwala, Balaji Krishnamurthy

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Transport equations in an enzymatic glucose fuel cell

by

Soham Jariwala and Balaji Krishnamurthy*,

Department of Chemical Engineering,

BITS Pilani, Hyderabad 500078, India.

Abstract:

A mathematical model is developed to study the effects of convective flux and operating temperature on the performance of an enzymatic glucose fuel cell with a membrane. The model assumes isothermal operating conditions and constant feed rate of glucose. The glucose fuel cell domain is divided into five sections, with governing equations describing transport characteristics in each region, namely - anode diffusion layer, anode catalyst layer (enzyme layer), membrane, cathode catalyst layer and cathode diffusion layer. The mass transport is assumed to be one-dimensional and the governing equations are solved numerically. The effects flow rate of glucose feed on the performance of the fuel cell are studied as it contributes significantly to the convective flux. The effects of operating temperature on the performance of a glucose fuel cell are also modeled. The cell performances are compared using cell polarization curves, which were found compliant with experimental observations.

Keywords: glucose, convection, fuel cell, hydrogen, diffusion, temperature.

*Corresponding author; E mail: balaji.krishb1@gmail.com