Introduction to fuel cells

Assignment-1

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1. A fuel cell operates at 800C and 1 atm pressure on 90% H_2 with 10% N_2 as fuel. The fuel is supplied at 100 ml/min. The active area of the fuel cell is 5 cm^2. The number of electrons transferred in the overall cell reaction is 2. Calculate the fuel utilization efficiency if the current drawn from the cell is 1.75 A/cm^2. Calculate the same if the operating pressure is increased to 2 atm.
2. Calculate the Ohmiclass in the above fuel cell, if the thickness of the electrolyte is 50μm. The conductivity of the electrolyte is 0.1 S/cm.
3. What are the challenges in decreasing the thickness of the electrolyte membrane ?
4. Write a computer program to generate the IV curve and Power density curve by solving the cell voltage equation and the Butler-Volmer equations.