

DEPARTMENT OF MECHANICAL ENGINEERING (AY-2020-21)

PROJECT GROUP NO: 11

Title: “ Modelling and Simulation of Solid Oxide Fuel Cell”

PROJECT BY:

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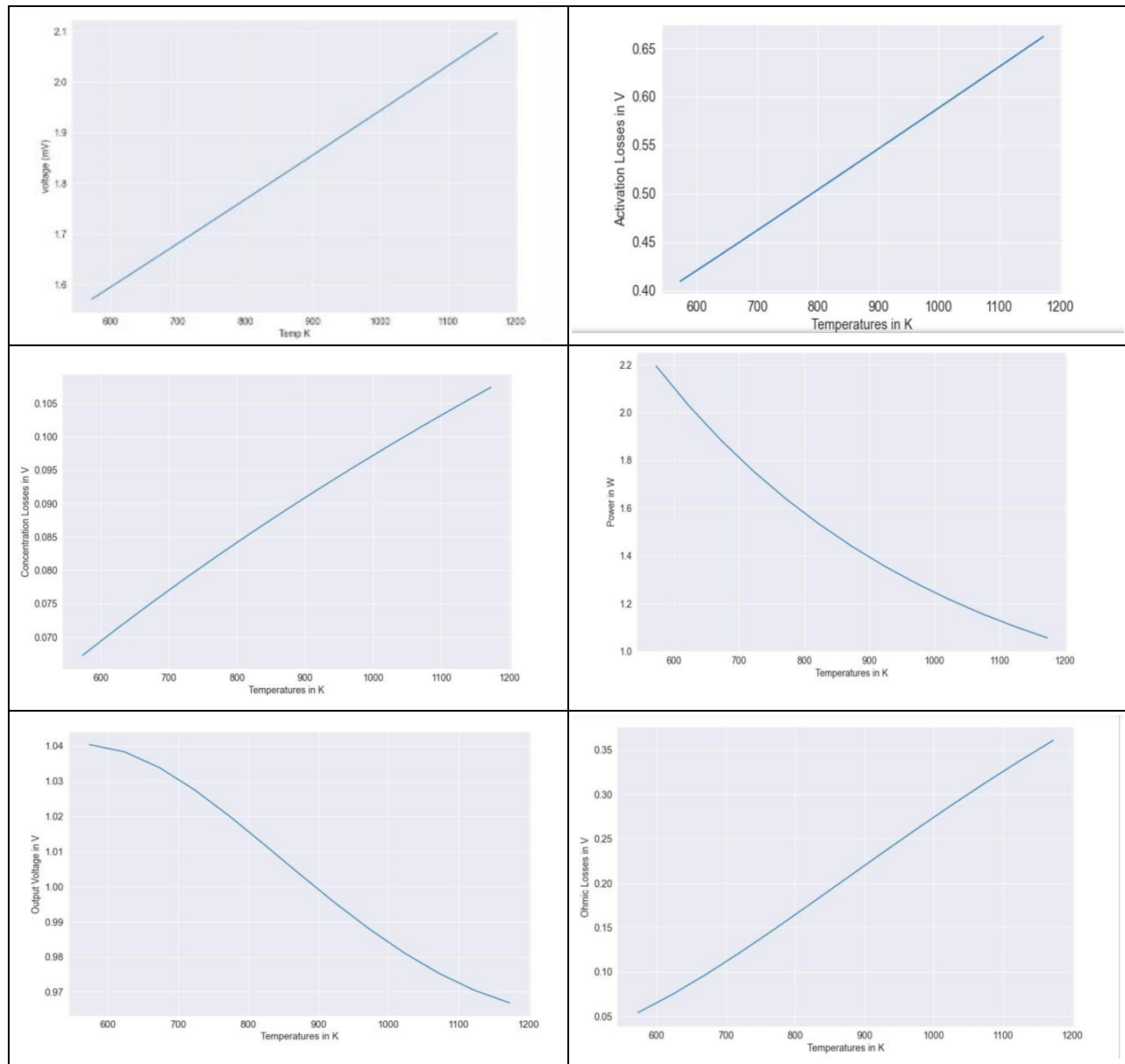
PROJECT OBJECTIVE:

- 1. To study the Structure, function and principle of Operation of Solid Oxide Fuel cell also Understanding the future scope of Solid Oxide Fuel Cell as a source of green energy and substitute to conventional fuels.**
- 2. Create a mathematical Model and simulate using PYTHON to analyze the working of SOFC at various conditions**

ABSTRACT:

This paper presents a review of studies on mathematical modeling of solid oxide fuel cells. Fuel cells are known for their reliability, power quality, eco-friendly nature and fuel efficiency. Its promising technology and extremely significant in the near future. This paper deals with the study of dynamic model of solid oxide fuel cell (SOFC) based on transfer function. The studied model includes the effect of activation, ohmic and concentration losses on the dynamic performances of SOFC. The performance of the model is tested for different fuel flow mode of operations. The effect of varying operating temperature on the performance of SOFC is also analyzed. Solid oxide fuel cell (SOFC) is being developed for a wide variety of applications because of their high efficiency, reliability, and fuel adaptability. This review discusses the particular issues facing the development of a high temperature solid-state fuel cell and the inorganic materials currently used and under investigation for such cells.

RESULTS AND CONCLUSION:



- Values for Nernst Voltage varies from 1.5 V to 2.5 V for 573 K to 1173 K temperature range. It shows us with the increase in temperature value of voltage is decreasing.
- Activation losses voltage varies from 0.4 V to 0.7 V for 573 K to 1173 K temperature range. Activation loss is increasing with increase in temperature .
- Concentration losses Voltage varies from 0.06 V to 0.11 V for the given temperature range. It shows concentration losses increases with increase in temperature.
- Ohmic losses voltage varies from 0.05 V to 0.37 V for the temperature range taken. It shows increase in ohmic loss with the increasing temperature.