

## Parametric Analysis of Syn-gas Fueled SOFC with Internal Reforming

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**Abstract :** This paper focuses on the thermodynamic analysis of Solid Oxide Fuel Cell (SOFC). In the present work the SOFC has been modeled to work with internal reforming of fuel which takes place at high temperature and direct energy conversion from chemical energy to electrical energy takes place. The fuel-cell effluent is a high-temperature steam which can be used for co-generation purposes. Syn-gas has been used here as fuel which is essentially produced by steam reforming of methane in the internal reformer of the SOFC. A thermodynamic model of SOFC has been developed for planar cell configuration to evaluate various losses in the energy conversion process within the fuel cell. Cycle parameters like fuel utilization ratio and the air-recirculation ratio have been varied to evaluate the thermodynamic performance of the fuel cell. Output performance parameters like terminal voltage, cell-efficiency and power output have been evaluated for various values of current densities. It has been observed that a combination of a lower value of air-circulation ratio and higher values of fuel utilization efficiency gives a better overall thermodynamic performance.

**Keywords :** current density, SOFC, fuel utilization factor, recirculation ratio

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