**NOMENCLATURE**

\( A_c \) cell area, cm\(^2\)

\( E \) Nernst potential or open circuit voltage, V

\( E_0 \) ideal cell voltage at standard conditions, V

\( F \) Faraday constant, 96485 C/mole

\( G \) Gibbs free energy, kJ/kg

\( H \) Enthalpy, kJ

\( h \) Specific enthalpy, kJ/kg

\( I \) exergy destruction rate, kW

\( j \) current density, mA/cm\(^2\)

\( \text{LHV} \) lower heating value, kJ/kg

\( m \) mass flow rate, kg/s

\( P \) pressure, kPa

\( P_{\text{ele,DC}} \) DC power output of the fuel cell stack, kW

\( P_{\text{ele,AC}} \) AC power output of the fuel cell stack, kW

\( P_{\text{net}} \) net power output of the plant, kW

\( P_{\text{gt}} \) Net power output from gas turbine, kW

\( Q \) heat transfer rate, kW

\( Q_{\text{Gen,FC}} \) heating rate generated within the cell stack, kW

\( R \) universal gas constant, 8.314 J/mole K

\( R_g \) Gas constant kJ/kg K

\( r_p \) Pressure Ratio
s  Specific entropy, kJ/kgK
SCR  ratio of number of moles of steam to carbon
T  temperature, K
TIT  turbine inlet temperature, K
T₀  reference temperature, K
Uᵢ  fuel utilization factor
V  voltage, V
Vₘᵋss  sum of the voltage losses due to irreversibilities

**Greek Symbols**

ψ  specific exergy flow, kJ/kg
Φ  exergy ratio
λ  Air stoichiometric ratio
γ  Ratio of specific heats
°  Reference conditions

**Subscript**

a  Anode
c  Cathode
cc  Combustion chamber
ex  Exergy
ele  Electrical
Ex,ch  chemical exergy of fuel, kJ/kg
Ex,fm  mechanical exergy of fuel, kJ/kg
f  Fuel
fc  fuel cell
Gen  generator
in  Inlet
invert  DC–AC inverter
out  Outlet
Ph,f  physical exergy of fuel, kJ/kg
rxn  Chemical reaction
th,f  thermal exergy of fuel, kJ/kg
th  Thermal

**Acronyms & Abbreviations**

CHP  Combined Heat & Power
FC  Fuel cell
GT  Gas turbine
MCFC  Molten Carbonate Fuel Cell
OCV  Open Circuit Voltage
OCED  Organization for Economic Corporation Development
PACE  Power at Combined Efficiency
STAG  Steam and Gas Turbine
SOFC  Solid Oxide Fuel Cell
TIT  Turbine inlet temperature