

Design, construction and characterization of a PEM water electrolyzer prototype stack

J. Roberto Flores Hernández^{1*}, I. Lorena Albarrán Sánchez¹ and Ulises Cano Castillo¹

¹Gerencia de Energías No Convencionales del Instituto de Investigaciones Eléctricas,
Reforma 113, Col. Palmira, Cuernavaca, Morelos, C.P. 62490, México.

*Tel: (777)3623811, ext. 7781, mail: jrflores@iie.org.mx

ABSTRACT

The design, construction and characterization of a PEM water electrolyzer prototype stack, with a nominal power of 1kW, are presented in this paper. The performance of the PEM water electrolyzer was evaluated at different temperatures (25, 40, 50, 60 and 70 °C) obtaining a maximum efficiency of about 75% at 1A/cm² current density and 70 °C of operating temperature. Renewable primary energy sources are thought to increase their overall efficiency if their installed capacity surplus is stored as hydrogen from electrolysis for later use as a fuel in a fuel cell. The amount of hydrogen produced in this prototype had a flux of 350LH₂/h at 50A under 914W of applied electrical power. The PEM electrolyzer was investigated by impedance spectroscopy and the voltage measurement at each individual cell was carried out, both results are presented too along with an energy analysis.