

## Performance Study of Membranes on an Electrochemical Hydrogen Compressor

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### ABSTRACT

The electrochemical hydrogen compression (EHC) is a scarcely explored alternative to conventional hydrogen compression methods. The EHC uses the transport phenomena presented in the operation of Proton Exchange Membrane (PEM) technologies, provides important advantages such as low energy demand to reach high compression rates, it is noiseless, low maintenance is required, and unpolluted hydrogen can be obtained. Like in a PEM fuel cell or PEM electrolyzer, the core of the compressor is a Membrane-Electrode Assembly (MEA). One of the main challenges is to find a membrane with a high ionic conductivity and capable of withstand a high pressure between anode and cathode. This work shows the evaluation of four different membranes Nafion, S-PEEK, F>N1, F>S in an EHC system based on an Electrochem PEMFC (5 cm<sup>2</sup>). Potential pulses from 100 to 800 mV were applied to the EHC while the pressure increase in the compression chamber was monitored.

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