DESIGN AND MANUFACTURE OF LIGHT-WEIGHT, AIR BREATHING
PROTON EXCHANGE MEMBRANE FUEL CELLS
Sriram Isanaka

ABSTRACT
Research conducted was aimed at addressing the size and weight limitations of Proton Exchange Membrane
(PEM) fuel cells by building cells that are fraction of the weight of traditional fuel cells with excellent
hydrogen sealing, without adversely affecting performance. Two designs, an Axis Symmetric Architecture
(ASA) and a modified flat plate, were proposed to overcome the weight, size and cost limitations. α –
prototypes of a single cell PEM fuel cell designed and built were measured at 181 grams and 142 grams
respectively for ASA and modified flat plate designs. Comparatively a single cell traditional flat plate design
weighed 2875 grams. Their performance also compared favorably with a traditional fuel cell design. The use
of polymers for plate materials and welding and silicone combination for sealing makes these designs built
significantly lighter and easy to manufacture and assemble. The results of mass transport finite element
analysis and manufacturing and assembly assessment will be shown to validate the concepts proposed.

*The publication of this abstract is intended for educational purposes only from an internal symposium and its content has not been peer-reviewed.