MONDAY, AUGUST 22, 2005, P.M.

SESSION 3B: INTERNATIONAL SYMPOSIUM ON FUEL CELL AND HYDROGEN TECHNOLOGIES

BUSINESS
Sponsor(s): Materials Science and Engineering Section, The Metallurgical Society of CIM
Room: Imperial Ballroom 2
Chairman: D. P. WILKINSON, University of British Columbia

PAPER 3B.1 — 16:00
FUEL CELL AND HYDROGEN R&D TARGETS AND FINDING - A COMPARATIVE STUDY.
K-A. ADAMSON, D. JOLLIE and A. BAKER, Fuel Cell Today, United Kingdom

If fuel cells and hydrogen are to become a mass market reality a substantial amount of further research and development needs to be undertaken. Setting R&D targets, and providing funding are areas central to the development of the market, and areas in which a number of governments worldwide are highly active. This paper takes three high profile regions, Canada, Korea and Japan and analyses the R&D targets and funding levels for hydrogen and fuel cells. The aim of the paper is to provide a picture of where each region is heading, and its strengths and weaknesses, in terms of R&D.

PAPER 3B.2 — 16:20
MAXIMIZING FUEL CELL TEST RELIABILITY.
C. ANDREWS, Fideris Incorporated, Texas USA

Fuel cell testing requires fully automated operation, on-site configuration of tests, and real-time monitoring for performance and failures. Balancing the flexibility and programmability of a test station with reliability, cost, and user interface can be a daunting challenge to the test equipment engineer. Endurance testing of fuel cells requires the highest level of reliability for test stand hardware and software without compromising automation capabilities or users interface. Techniques for implementing an ultra-reliable test platform addressing hardware limitations, sophisticated watchdog monitoring to prevent inadvertent shutdowns, and software limitations (e.g., balancing a highly-functional graphical users interface with reliability) are presented.

PAPER 3B.3 — 16:40
BRINGING FUEL CELL TECHNOLOGY TO MARKET – BRIDGING THE GAP FROM TECHNICAL SUCCESS IN THE LABORATORY TO PRODUCT SUCCESS IN THE MARKETPLACE.
A. VARMA and R. QUICK, Sustainable Development Technologies Canada, Canada

Successful technology commercialization occurs when a company is focused on creating shareholder value by providing a reliable product at a price point attractive to the market, while at the same time maintaining strict control of its internal cash burn rates. Developing a technology platform and a market platform are equally important in the commercialization of new technologies such as fuel cells. This paper will discuss some of the key barriers that may prevent successful market entry for emerging and disruptive technologies, such as: R&D priorities, supply chain / manufacturing issues, materials, cost reduction strategies, customer needs, developing a market pull strategy, institutional barriers such as existing regulatory/approvals processes and/or current design/purchasing practices, product reliability and resilience, and finding the right path to market.

SDTC is an arms length foundation that aims to financially support the successful market entry of emerging and disruptive technologies that can provide significant environmental benefits to Canada. The fuel cell industry, which represents one such technology, is at a critical point in its evolution where market receptivity and the technology platform are converging to potentially create significant customer advantages for fuel cell products being developed today. Since its inception in 2001, SDTC has received over 850 business cases from which it has identified successful strategies to overcome the noted barriers to commercialization. While maintaining commercial confidentiality, the SDTC database will be mined to: Identify specific success stories that have overcome various barriers and discuss their strategy; identify specific fuel cell related industry experiences that hinder successful market uptake.

The general attributes and trends of successful technology developments identified in this paper will hopefully provide guidance to technology developers and prepare them to successfully tackle the next set of hurdles on the path to commercializing their technology, once they have proven their technology works in the laboratory.

PAPER 3B.4 — 17:00
ANODE MATERIAL AND FABRICATION DEVELOPMENT FOR MAGNESIUM-AIR FUEL CELL.
Z. TANG, Z. XIE, M. STAITE and D. GHOSH, NRC Institute for Fuel Cell Innovation, Canada

A collaborative project was performed between NRC Institute for Fuel Cell Innovation and MagPower Systems Inc, to develop a cost effective fabrication process to manufacture the anode for magnesium-air fuel cell with improved performance. A novel fabrication process was developed, which resulted in a porous microstructure with increased surface area, instead of the traditional solid structure. This porous anode greatly increased power density in the magnesium-air power source. This fabrication process is very simple and cost effective. Especially, this process makes it convenient to incorporate different alloying addition, as well as hydrogen inhibitor and pH controlling agent into the anode. The anode composition was designed so that micro galvanic cells were formed as current is drawn out of the fuel cell, and resulting increased dissolution rate of Mg. It is feasible to incorporate hydrogen inhibitor and pH controlling agent into the porous anode, and the anode with some kind of inhibitors exhibited improved electrochemical performance. This paper describes the electrochemical performance of anodes with designated porous structure and alloying addition. Furthermore, quantitative kinetics analysis of the obtained I-V curves and electrochemical impedance spectroscopy were carried out to clarify the mechanism.

PAPER 3B.5 — 17:20

MATERIALS FOR POWER SOURCES TO MEET MILITARY REQUIREMENTS.

E. ANDRUKAITIS, Defense Research & Development Canada, Canada

The increasing use of electronic equipment by the Canadian Forces has increased the importance of electric power. A power source that is packed with energy and yet light, small and durable is the common request of military users, but this needs to be achieved while addressing the requirements of safety, reliability and low temperature performance. The potential use of fuel cells in a military environment has become a possibility in several areas in the 21st century. Some examples of power source requirements and the R&D required to give better, higher energy power systems in the future will be discussed.