Faculty of Applied Science
CHEMICAL ENGINEERING
Queen's UNIVERSITY

"Diesel Reforming Effects on SOFC Durability"

T.A. Trabold,
Golisano Institute for Sustainability, Rochester Institute of Technology
Rochester, New York

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ABSTRACT

It is now illegal in many regions to idle the engine of a heavy-duty truck to provide the cabin electrical needs of the driver. A viable alternative technology is a solid oxide fuel cell (SOFC)-based auxiliary power unit (APU) that operates in the range of 3-5 kW, and provides sufficient power for cabin lighting, cooking etc. A significant advantage of the SOFC system is that on-board diesel fuel can be reformed into a hydrogen and carbon monoxide-rich fuel stream that is delivered to the anode side of the fuel cell stack. This reformation process is, however, associated with a number of potential degradation modes, including solid carbon (soot) formation. In this work, we apply equilibrium analysis and lab-scale fuel reforming experiments to quantify the carbon formation process as a function of temperature and oxygen-to-carbon ratio. This novel information is then applied to develop accelerated durability testing protocols for the full APU system.

BIO

Dr. Thomas Trabold is an Associate Professor and Co-Director of the Center for Sustainable Mobility at RIT, with primary research focus in fuel cells, batteries and alternative fuels. He has over 20 years experience in industrial research and development, ranging from nuclear thermal-hydraulics at General Electric, to photoreceptor development and manufacturing at Xerox, to research and demonstration of proton exchange membrane fuel cell systems at General Motors. In the latter position, he was a Professional Technical Fellow and Laboratory Group Manager, with responsibility for engineering research activities in the U.S. and Germany.

Dr. Trabold has a strong record of accomplishment in experimental research, with over 60 technical publications and various invited lectures at international conferences. He also has contributed to development of significant intellectual property, resulting in 28 granted U.S. and international patents, and 50 patents pending. Dr. Trabold holds B.S and Ph.D. degrees in Chemical Engineering from Clarkson University.