



PEM Fuel Cell Diagnostic Tools: Volume 1 (Pem Fuel Durability Handbook)

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PEM Fuel Cell Diagnostic Tools presents various tools for diagnosing PEM fuel cells and stacks, including *in situ* and *ex situ* diagnostic tools, electrochemical techniques, and physical/chemical methods. The text outlines the principles, experimental implementation, data processing, and application of each technique, along with its capabilities and weaknesses.

The book covers many diagnostics employed in the characterization and determination of fuel cell performance. It discusses commonly used conventional tools, such as cyclic voltammetry, electrochemical impedance spectroscopy, scanning electron microscopy, and transmission electron microscopy. It also examines special tools developed specifically for PEM fuel cells, including transparent cells, cathode discharge, and current mapping, as well as recent advanced tools for diagnosis, such as magnetic resonance imaging and atomic force microscopy. For clarity, the book splits these diagnostic methodologies into two parts—*in situ* and *ex situ*. To better understand the tools, PEM fuel cell testing is also discussed. Each self-contained chapter provides cross-references to other chapters.

Written by international scientists active in PEM fuel cell research, this volume incorporates state-of-the-art technical advances in PEM fuel cell diagnosis. The diagnostic tools presented help readers to understand the physical and chemical phenomena involved in PEM fuel cells.

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Editorial Review

About the Author

Haijiang Wang is a senior research officer, manager of multiprojects, and the core competency leader of the Unit Fuel Cell Team in the National Research Council Canada Institute for Fuel Cell Innovation (NRC-IFCI). He is also an adjunct professor at five universities, including the University of British Columbia and the University of Waterloo. With 25 years of experience in electrochemistry and fuel cell technology, Dr. Wang has published more than 100 journal and conference papers and has been issued three patents. His research focuses on novel fuel cell design and materials as well as fuel cell diagnosis and durability.

Xiao-Zi Yuan is a research officer and project leader of the Unit Fuel Cell Team in the National Research Council Canada Institute for Fuel Cell Innovation (NRC-IFCI). Dr. Yuan has published more than 80 journal and conference papers and holds five patents in China. Her research focuses on PEM fuel cell design, testing, diagnosis, and durability.

Hui Li is a research council officer and technical leader for the PEM Fuel Cell Failure Mode Analysis project and PEM Fuel Cell Contamination Consortium in the National Research Council Canada Institute for Fuel Cell Innovation (NRC-IFCI). Dr. Li has coauthored more than 30 journal papers and has technology licensed to the Mantra Energy Group. Her research focuses on PEM fuel cell contamination and durability testing, the preparation and development of electrochemical catalysts with long-term stability, catalyst layer/cathode structure, and catalyst layer characterization and electrochemical evaluation.

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