

BOGDAN GURAU

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JOB OBJECTIVE

To obtain a challenging and rewarding engineering position with growth opportunities within chemical industry and applied fields.

EDUCATION/DEGREES**1999 - 2002 Ph.D. in Chemical Engineering, Illinois Institute of Technology**

Catalysis and engineering related issues of Direct Methanol Fuel Cells

1997 - 1999 M.S. in Chemical Engineering, Illinois Institute of Technology

Development and testing of binary, ternary and quaternary electrocatalysts for Direct Methanol Fuel Cells

1989 - 1994 BS in Chemical Engineering, Polytechnic University Of Bucharest

Design and technological optimization of ammonia synthesis and natural gas reforming reactors

SKILLS

Electrocatalyst Evaluation - Hands-on experience with all the electrochemical techniques pertaining to fuel cell electrocatalyst evaluation (linear sweep voltammetry, cyclic voltammetry, electrochemical area determination, etc)

- Hand-on experience with most of the powder characterization techniques (BET, XRD, SEM, TEM, XRF, temperature programmed adsorption - desorption, TGA, etc.)

MEA Preparation Hands-on experience with MEA preparation for low and intermediate temperature PEM fuel cells. The applied techniques comprise of:

- electrocatalyst application on gas/liquid diffusion materials by direct painting and/or spraying.
- direct painting and/or spraying onto the membrane (catalyst coated membranes)

MEA Evaluation Hands-on experience with all the techniques pertaining to MEA evaluation

- Linear sweep voltammetry (polarization curves)
- Life tests under various conditions (temperatures, pressures, relative humidity, etc.)

MEA Degradation Evaluation of various mechanisms for MEA degradation

- membrane degradation (AC impedance, current interrupt techniques)
- catalyst degradation (catalyst agglomeration evaluation as life tests progress via CO stripping and/or XRD)

Short Stack Construction Built and tested direct formic acid short stacks for integration in portable power devices

PROFESSIONAL EXPERIENCE

2007 to present University of Illinois Urbana Champaign - Research Scientist

- Design and build microliter scale hydrogen-air and direct formic acid fuel cells for portable power sources.

- Integrate the hydrogen-air fuel cells with metal hydride based hydrogen generators for stand alone operation.

2005 to 2007 Tekion, Inc. - Senior Engineer

- Optimization of the operating parameters of Direct Formic Acid Fuel Cells. Building membrane electrode assemblies, testing them and correcting mass transport and ohmic resistance issues.
- Evaluation of the fuel loss in Direct Formic Acid Fuel Cells by developing detailed carbon and hydrogen balances. Reaction product determination by means of gas chromatography and unreacted acid measurement.
- Build and evaluate Direct Formic Acid Fuel Cell stacks for applications up to 20 Watts under Tekion's DoD project.

2002 to 2004 Cabot Superior MicroPowders - Project Manager

- Combinatorial discovery of low Pt loading alloy electrocatalysts for the oxygen reduction reaction in PEM fuel cells for automotive applications, under Cabot Superior MicroPowder's contract with the Department of Energy.
- Evaluation of novel materials that could potentially increase the catalytic activity of fuel cell electrocatalysts, based on surface modification of carbon supports. NIST contract.
- Membrane Electrode Assembly (MEA) optimization for PEM fuel cells.
- Optimization of Direct Methanol Fuel Cell (DMFC) MEAs and electrocatalyst inks under Superior Micropowder's NIST contract.
- Built and evaluate PBI membranes for intermediate temperature (180°-200°C) PEM fuel cells. NIST contract.

1997 to 2002 Illinois Institute of Technology - Graduate Student

- Evaluation of various catalytic materials for PEM fuel cells, Membrane Electrode Assembly preparation.
- Optimization of operating parameters (temperature, pressure, flow-rates) for PEM fuel cells.
- Study of methanol crossover in Direct Methanol Fuel Cells (DMFC) by means of gas chromatography. Impact of fuel crossover on the electrical performance and fuel utilization of DMFCs systems.
- Design of intermediate temperature (300 - 400°C) laboratory scale reactors for reforming of methanol and other potential hydrogen carriers. Use of gas chromatography to study the product distribution of methanol reforming reaction.

LANGUAGES KNOWLEDGE

English - fluent
German - elementary
Romanian - native language

PUBLICATIONS

A miniature direct formic acid fuel cell battery. in Journal of Power Sources, in press

Integrated micro-power source based on a micro-silicon fuel cell and a micro electromechanical system hydrogen generator. in Journal of Power Sources, (2008), 185(2), 1305-1310

Composite polymer electrolyte membranes and electrode assemblies with decreased fuel crossover for direct liquid feed fuel cells. U.S. Pat. (2007), US 2007154760

Investigation of methanol oxidation electrokinetics of Pt using the asymmetric electrode technique. in Journal of New Materials for Electrochemical Systems (2004), 7(4), 281-286.

Methanol crossover in direct methanol fuel cells: a link between power and energy density. in Journal of Power Sources (2002), 112(2), 339-352.

Deuterium isotope analysis of methanol oxidation on mixed metal anode catalysts. in Electrochimica Acta (2002), 47(18), 2913-2919.

In situ 50°C FTIR spectroscopy of Pt and PtRu direct methanol fuel cell membrane electrode assembly anodes. in Journal of the Electrochemical Society (2002), 149(5), A554-A557.

Synthesis and characterization of PtSn/carbon and Pt₃Sn/carbon nanocomposites as methanol electrooxidation catalysts. in Journal of Nanoscience and Nanotechnology (2002), 2(1), 81-87.

Spectroscopic study of NEMCA promoted alkene isomerizations at PEM fuel cell Pd-Nafion cathodes. in Solid State Ionics (2000), 136-137 713-720.

In Situ Stark Effects with Inverted Bipolar Peaks for Adsorbed CO on Pt Electrodes in 50°C Direct Methanol Fuel Cells. in Journal of Physical Chemistry B (2000), 104(31), 7377-7381.

Structural and Electrochemical Characterization of Binary, Ternary, and Quaternary Platinum Alloy Catalysts for Methanol Electro-oxidation. in Journal of Physical Chemistry B (1998), 102(49), 9997-10003.

Combinatorial electrochemistry: a highly parallel, optical screening method for discovery of better electrocatalysts. in Science (Washington, D. C.) (1998), 280(5370), 1735-1737.

Proton spillover promoted isomerization of n-butylenes on Pd-black cathodes/Nafion 117. in Journal of the American Chemical Society (1997), 119(47), 11550-11551.

REFERENCES

Available upon request.