Timothy J. Fawcett, Ph.D.

Education

University of South Florida Tampa, FL

- Doctor of Philosophy in Chemical Engineering, May 2006
  Dissertation: "Investigation into the Hydrogen Gas Sensing Mechanism of 3C-SiC Resistive Gas Sensors"
  Advisor: Dr. John T. Wolan
- Master of Science in Chemical Engineering, May 2004
  Thesis: "Robust Silicon Carbide Resistive Gas Sensors"
  Advisors: Dr. John T. Wolan and Dr. Stephen E. Saddow
- Bachelor of Science in Chemical Engineering, May 2004
  Honors Thesis: "Hydrogen gas sensing using 3C-SiC/Si epitaxial layers"

Bonanza High School Las Vegas, NV
Graduated with High Honors June 1999

Related Work Experience

04/10 - present Senior Research Engineer, University of South Florida, College of Engineering, Tampa, FL

- Design, engineer, build, and program experimental and instrumentation systems for research and academic activities within the College of Engineering
- Represent College of Engineering to all IT and technical related activities
- Manage four (4) technicians as part of the College of Engineering Technical Support Services Group which serves both research and academic activities within the College of Engineering
- Mentor several graduate students performing modeling and simulation based research

01/07 – 04/10 Director of Research and Development, Hydrogen Technology Applications, Inc., Clearwater, FL

- Direct all research activities for the development of hydrogen-rich gas generation processes via water electrolysis as well as alternative energy applications for hydrogen-rich gases
- Responsible for all intellectual property including drafting and prosecuting all new and existing U.S. and International patent and trademark applications
- Filed 2 patent US and international applications
- Developed an understanding for electrochemical systems as applied to alternative energy applications, especially water electrolysis

05/06 – 01/07 Post-Doctoral Researcher, Dept. of Chemical Engineering, University of South Florida, Tampa, FL

- Managed laboratory's research activities and directed graduate and undergraduate researchers
- Continued development of resistive gas sensor technology

05/02 – 05/06 Graduate Research Assistant, Dept. of Chemical Engineering, University of South Florida, Tampa, FL

- Developed high temperature, extreme environment resistive hydrogen gas sensors based on wide bandgap semiconductor materials such as silicon carbide
- Discovered sensing mechanism for gas sensors fabricated from resistive semiconductor devices
- Awarded "Outstanding Research Assistant" award in April, 2006

Other Work Experience

01/07 – Present Adjunct Professor, Dept. of Chemical Engineering, University of South Florida, Tampa
ECH6840 – Mathematical Methods in Chemical Engineering
ECH4265C – Mass Transfer Operations

05/04 – 08/04 Instructor, Dept. of Chemical Engineering, University of South Florida, Tampa, FL
ECH 4845 – Quantitative Methods

01/03 – 05/04 Teaching Assistant, Dept. of Chemical Engineering, University of South Florida, Tampa, FL
ECH 4415 – Process Engineering III: Reacting Systems - Dr. John Wolan

08/01 – 05/02 Teaching Assistant, Dept. of Chemical Engineering, University of South Florida, Tampa, FL
ECH 4264 – Transport Phenomena - Dr. Venkat Bhethanabolta

Technical Skills/Experience

Process Control, Data Acquisition, and Instrumentation

- Extensive experience with data acquisition and process control via analog input/output, digital input/output, serial, and GPIB data acquisition devices interfaced via LabVIEW
- Experience using various forms of instrumentation such as oscilloscopes, arbitrary function generators, digital multimeters, flow meters/controllers, etc.

Simulation, Modeling, and Programming

- Matlab, C, and C++ programming languages including parallel programming experience with MPI
- Chemical process simulators such as ChemCAD
- Finite element method simulation software – Comsol (Femlab) and FIDAP (Fluent)
- Extensive experience with Windows, UNIX, and Linux computing environments including common software such as Microsoft Office and GNU applications
- Exposure to Solidworks and NX (3D CAD), OrCAD (Circuit Simulation)

Data Analysis

- Model driven statistical analysis including curve fitting
- Advanced analysis including principle component, autocorrelation, and random processes analyses

Analytical Techniques

- Scanning electron microscopy (SEM)
- Nuclear magnetic resonance (NMR)
- Fourier transform infrared spectroscopy (FTIR)
- Gas chromatography (GC)
- Profilometry and ellipsometry

Microelectronic Fabrication

- Photolithography, electron beam evaporation, sputtering, rapid thermal processing, Bruce furnace operation and reactive ion etching
- Device layout using Cadence Virtuoso
- Device simulation using Medici and Comsol (Femlab)

Electrochemical Hydrogen Production

- Design, engineer and implement existing and novel hydrogen and hydrogen-rich gas generation processes
- Significant knowledge of electrode materials

Alternative Energy Applications

- Design, engineer, and implement alternative energy applications using hydrogen-rich gases

References

- Dr. Venkat Bhethanabotla - University of South Florida, Chairperson, Chemical Engineering Department, Tampa, Florida, bhethana@usf.edu, (813) 974-3997
- Dr. Stephen E. Saddow – University of South Florida, Electrical Engineering Department, Tampa, Florida, saddow@usf.edu, (813) 974-4773
- Dr. Anita Lloyd Spetz –Linköping University, S-SENCE and Division of Applied Physics, Linköping, Sweden, spetz@ifm.liu.se, +46 13 281710
- Dr. Jose Zayas-Castro – University of South Florida, Associate Dean of Research, Tampa, Florida, josezaya@usf.edu, (813) 974-5589
- Dan Majchrzak – University of South Florida, Director of Research Computing, Information Technology, Tampa, Florida, dan@usf.edu, (813) 974-2973
- Dr. Aydin Sunol - University of South Florida, Chemical Engineering Department, Tampa, Florida, asunol@usf.edu, (813) 974-3566
- Additional references available upon request

Publications

Patents

International Patent Application Serial No. PCT/US2009/31497 filed January 21, 2009
U.S. Patent Application Serial No. 12/354,003 filed January 15, 2009
International Patent Application Serial No. PCT/US2009/065834 filed November 25, 2009
U.S. Patent Application Serial No. 12/624489 filed November 24, 2009
U.S. Patent Provisional Application Serial No. 61/118705 filed December 01, 2008
U.S. Patent Provisional Application Serial No. 61/023,145 filed January 24, 2008

Journal Publications

T. J. Fawcett, J. T. Wolan, R. L. Myers, J. Walker, and S. E. Saddow, "Wide-range (0.33%-100%) 3C-SiC resistive hydrogen gas sensor development," Applied Physics Letters 85 (3) 416-418 (2004).

F. Yun, TS. Chevtchenko, TY.-T. Moon, H. Morkoç, T. J. Fawcett, and J. T. Wolan, "GaN resistive gas sensors," Applied Physics Letters 87, 073507 (2005).

A. A. Sagüés, J. T. Wolan, A. De Fex, and T. J. Fawcett, "Impedance behavior of nanoporous SiC," Electrochimica Acta 51 (8-9), 1656-1663 (2006).

T. J. Fawcett, M. Reyes, A. Lloyd Spetz, S. E. Saddow, and J. T. Wolan, "Thermal detection mechanism of SiC based resistive gas sensors," Applied Physics Letters 89, 182102 (2006).

T. J. Fawcett, M. Reyes, A. Lloyd Spetz, S. E. Saddow, and J. T. Wolan, "Detection mechanism of SiC based resistive gas sensors," (in preparation to be submitted to Journal of Applied Physics).

Conference Publications

Oral presentation - T. J. Fawcett, J. T. Wolan, R. L. Myers, J. Walker, and S. E. Saddow, "Robust gas sensors using 3C-SiC epitaxial layers," Materials Research Society Spring Meeting, April 12-16, 2004, San Francisco, California.

Poster presentation - T. J. Fawcett, J. T. Wolan, R. L. Myers, J. Walker, and S. E. Saddow, "Hydrogen gas sensors using 3C-SiC/Si epitaxial layers," International Conference on Silicon Carbide and Related Materials, Lyon, France, 2003. Mater. Sci. Forum 457-460, 1499 (2004).

Poster presentation - F. Yun, T. J. Fawcett, S. Chevtchenko, Y-T. Moon, H. Morkoç, and J. T. Wolan, "GaN resistive gas sensors for hydrogen detection," International Conference on Silicon Carbide and Related Materials, Pittsburgh, Pennsylvania, 2005. Materials Science Forum Vols. 527-529, 1553-1557 (2006).

Oral presentation - T. J. Fawcett, M. Reyes, A. Lloyd Spetz, S. E. Saddow, and J. T. Wolan, "Thermal detection mechanism of SiC-based resistive gas sensors," Materials Research Society Spring Meeting, April 17-21, 2006, San Francisco, California. Mater. Res. Soc. Symp. Proc. 911, 0911-B12-06 (2006).