

October 1, 2007

**JOHN JOSEPH RUSEK**

Swift Enterprises  
1291 Cumberland Avenue  
Suite B102  
West Lafayette, Indiana 47906  
Telephone: (765) 464-8336, x-21  
Facsimile: (765) 464-1877  
john.rusek@swiftenterprises.com

**1. Education**

Doctor of Philosophy

Major Field: Chemical Engineering

Minor in Atomic Physics

Case Western Reserve University (1983)

Dissertation: *Synchrotron Radiation Studies of Passive Iron Films - EXAFS*

Master of Science in Chemical Engineering

Case Western Reserve University (1981)

Thesis: *The Application of the Extended X-Ray Absorption Fine Structure Technique to the Study of Passive Ferrous Metal Films*

Bachelor of Science in Chemical Engineering

Minor in Surfaces and Catalysis

Case Western Reserve University (1976)

**2. General Interests**

Professor Rusek has conceived and developed four courses based on his 31-year professional career in the propulsion and power industries. "Advanced Energy Conversion" (AAE536) and "Future Propulsion Concepts" (AAE628) contain the graduate level knowledge to enable the creative process that is required to be a successful engineer within the aerospace industry. He initiated two advanced graduate courses, "Kinetics of Power Systems" (AAE590P) and "Physics of Future Propulsion" (AAE590F) which give students the advanced tools necessary to fully explore advanced propulsion systems. To that end, his research interests are tied dynamically to these courses in the following examples.

Rusek patented an alcohol-based nontoxic hypergolic miscible fuel for spontaneous ignition with hydrogen peroxide while with the United States Navy. Current corporate research is aimed at studying the kinetics of ignition delay for this unique bipropellant combination, maximizing the energy density within this class of fuels, and in developing robust injector designs for usage in liquid rocket engines.

Rusek patented a class of heterogeneous catalysts for the propulsive decomposition of the highest strength hydrogen peroxides, while with the United States Air Force. Current corporate research is targeted at understanding the function of the main catalytic agents and the function of catalytic promoters in concert with the monolithic substrates.

Rusek is corporately investigating the electrochemistry of direct fuel cells. This research has led to pending patents. Alkaline species are utilized to destabilize the hydrogen peroxide by increasing the local pH. 1.3 V and 130 mA (current density of 10mA / cm<sup>2</sup>) have been achieved from a 10% basified hydrogen peroxide solution. Prototypes have been demonstrated which minimize alkaline concentration and optimize hydrogen peroxide concentration.

Rusek is conducting corporate explorations into field propulsion effects at the system level. The electrokinetic effect is manifested when a high voltage potential is put across an optimized capacitor, which in turn creates a force. The electrokinetic effect is a means to produce a force based on capacitance, surface area of the electrodes, the applied voltage, and the non-linearity of the electric field gradient used in association with the capacitor.

Lastly, Rusek is exploring Inertial Electrostatic Confinement at the systems level, as applied to nuclear fusion reactions. The goal is to use virtual cathodes to induce over-breakeven fusion events in aneutronic nuclear reactions, specifically p/B<sup>11</sup> reactants for direct electrical energy conversion.

### **3. Academic and Industrial Experience**

#### *a) Current Employment*

*January 2001 to present, Research Director, Swift Enterprises, Ltd., West Lafayette, Indiana.*

Doctor Rusek started a small federally registered business where he is the Research Director. Swift Enterprises, Ltd. conducts experimental research, development and prototyping in advanced propulsion and power. The business employs technologists at the Purdue Research Park who conduct their research from federal and private funding sources.

*January 2001 to present, Adjunct Professor, School of Aeronautics and Astronautics, Purdue University, West Lafayette, Indiana.*

Rusek is an Adjunct Professor within the School of Aeronautics and Astronautics at Purdue. He is responsible for one graduate propulsion course per semester. He developed and taught *Kinetics of Power Systems* and *Physics of Future Propulsion*.

*January 2003 to present, Adjunct Professor, United States Air Force Academy, Colorado Springs, Colorado.*

Rusek is an Adjunct Professor within the Department of Astronautics at the USAFA. He teaches and provides research guidance to the USAF cadets as applied to the 400 level sounding rocket design and flight classes.

*August 1998 to present, Chief Engineer (WAE), Energetic Materials Department, Naval Air Warfare Center China Lake, California.*

Rusek is Chief Engineer for Energetic Materials within the United States Navy at China Lake, California. He is responsible for academic interface and technical guidance to particular US Naval missions and projects.

*b) Past Employment*

*August 1998 to January 2001, Assistant Professor, School of Aeronautics and Astronautics, Purdue University, West Lafayette, Indiana.*

Doctor Rusek was an Assistant Professor within the School of Aeronautics and Astronautics at Purdue. He was responsible as Professor of Propulsion for undergraduate teaching in *Jet Propulsion and Powerplants*, and graduate teaching in *Advanced Energy Conversion and Future Propulsion Concepts*. He was Graduate Advisor for two Doctoral Candidates, and six Masters' Candidates. His research areas included non-toxic hypergolic bipropulsion, non-toxic heterogeneous propulsion and power, fuel cells, field effect propulsion, and electrostatic fusion processes.

*January 1993 to January 1996, Adjunct Professor, School of Engineering, Antelope Valley College, Lancaster, California.*

Rusek taught Materials Science, and Engineering Orientation within the School of Engineering. Materials Science is offered once per year for one semester; during that time the class completes *The Science and Engineering of Materials* by Askeland. Engineering Orientation is offered once per semester during which the class is exposed to the engineering professions and core engineering courses emphasizing mathematics.

*December 1995 to August 1998, Chief Engineer - Energetic Materials, DP-3 (GS-14), United States Navy, Naval Air Warfare Center, China Lake, California.*

Rusek was the Chief Engineer of the Energetic Materials Division within the Airframe, Ordnance and Propulsion Department. Responsible for monopropellant, bi-propellant and solid propellant propulsion research as well as advanced combined-cycle propulsion concepts. He consulted within the department as well as in other Codes and DoD agencies. His primary research was in the use of hydrogen peroxide as an environmentally benign power source in both rocket and on-demand energy applications. His methodology employed surface phenomena and catalysis via university, government, and industry collaborations.

*July 1989 to December 1995, Research Chemical Engineer, GS-13, United States Air Force, Astronautics Laboratory, Edwards AFB, California.*

Rusek served as a specialist and technical focal point on advanced propulsion concepts and materials. His duties included being a surface phenomenology researcher and program manager/principal investigator for both the Advanced Polymer Components and Methods for Analyses of Reactive Surfaces in-house initiatives. He implemented the above programs through the efforts of two dozen researchers throughout the Air Force Research Laboratory

*January 1987 to July 1989, Research Chemical Engineer, GS-12, United States Air Force Rocket Propulsion Laboratory, Edwards AFB, California.*

Rusek conducted in-house exploratory research dealing with solid propellants. He served as the program manager/principal investigator for the Thermoplastic Elastomer Propellant Synthesis in-house research program. He was responsible for advancing the state of the art in the field of propellants by (1) conducting propellant formulation and evaluation studies on new and unique chemical ingredients in order to enhance the characteristics of new rocket systems; (2) determining the feasibility of making new chemical ingredients that require totally new concepts

in propellant processing; (3) developing new propellant processing technologies that are low-cost, continuous and that enabled the use of ingredients not processible by conventional means; (4) determining physical and chemical property data required in conjunction with development of ingredient specifications and qualitative and processing standards; (5) developing operational safety procedures for handling and testing of experimental high energy ingredients, sensitive plasticizers and solid propellants, and for the operation of new processing equipment; (6) developing relationships between molecular structure and material properties required of solid propellants; and (7) developing and evaluating novel hybrid propulsion systems.

*July 1983 to October 1986, Advanced Research Engineer, Exploratory Research Laboratory, Technical Center, Owens-Corning Fiberglas Corporation, Granville, Ohio.*

Rusek worked on exploratory research topics from a surface chemistry viewpoint. His most recent program dealt with the use of modified asphalts as high performance, inexpensive composite rocket propellant binders. He also conducted processing studies of liquid crystal polymer synthesis, theoretical studies of field effect catalysis and novel approaches to cadmium and chromium hazardous waste reclamation. He initiated research on iron surface dynamic coatings and brought this technology to fruition as a viable commercial product.

*September 1979 to July 1983, Research Engineer, Teaching Assistant, and Graduate Student, Department of Chemical Engineering, Case Western Reserve University, Cleveland, Ohio.*

Rusek's research project, *Ferrous Metal Corrosion and Passivation: An Interdisciplinary Investigation*, was directed towards obtaining a fundamental understanding of the structure, mechanism of formation and dynamic properties of passive films on polycrystalline iron. The project was funded by a grant from ONR with a three-year support of \$1,500,000.

His master's thesis dealt with the mathematical modeling of the surface structure and of the Extended X-Ray Absorption Fine Structure (EXAFS) spectra.

His doctoral dissertation concerned EXAFS experimentation. The sample cell was designed at CWRU and the experiments were conducted using the major synchrotron facility at the Stanford Linear Accelerator Center in Palo Alto, California.

*June 1981 to August 1981, Consulting Engineer, Pickands Mather and Company, Cleveland, Ohio.*

Rusek conducted research and proposed guidance concerning hazardous waste generation and rectification relative to international shipping.

*June 1978 to September 1981, Research Engineer, Corporate Research Center, UOP Inc., Des Plaines, Illinois.*

Rusek conducted research dealing with separation of defined polar organic contaminants from liquefied coal naphtha streams via cation exchanged zeolite molecular sieves.

He initiated research concerning purification of a fluidized catalytic cracker off-gas stream using novel extruded alloy hydrides.

He conducted research concerning separation of t-butyl hydroquinone from a mixed reaction mass by means of ionic sieve partitioning.

He conducted development, which included separating p-xylene from C-8 isomers and partitioning fructose from mixed polysaccharides.

*June 1976 to June 1978, Development Engineer, Experimental Development Department, UOP Process Division, Riverside, Illinois.*

Rusek operated and optimized pilot-scale fluidized catalytic cracking processes and SORBEX separation plants.

He developed methods to increase the surface area of extruded silica-alumina catalyst supports. A new method of gellation was discovered which yielded a 65% improvement in surface area.

He conducted theoretical studies of isomerization kinetics using first-principal arguments from atomic theory. The results of this study were tested and subsequently proven in pilot plant trials.

#### **4. Licenses, Registrations, and Certifications**

- Professional Engineer – Ohio
- Private Pilot, Single Engine Land, Instrument Rating
- Amateur Radio Operator

#### **5. Awards and Honors**

- 2003 Keynote Speaker – 6<sup>th</sup> Hydrogen Peroxide Propulsion Conference joint with JANNAF, Colorado Springs, Colorado
- 2002 AIAA Abe Zarem Educator Award presented at the 2002 National AIAA Conference
- 2001 Keynote Speaker – First International Conference on Green Propellants for Space Propulsion, Noordwijk, The Netherlands
- 2000 Distinguished Alumnus – Loyola Academy, Wilmette, Illinois
- 1999 Keynote Speaker and Conference Chair – Second International Hydrogen Peroxide Propulsion Symposium, Purdue University, West Lafayette, Indiana
- 1998 William B. McLean Prize – United States Navy Air Technology Medal, China Lake, California
- 1998 AIAA Best Paper Recognition – 1998 Missile Sciences Conference, San Diego, California
- 1998 USN Rear Admiral Commendation for Young Astronauts Program, Edwards AFB, California
- 1998 Conference Chair, First International Symposium on HTP, University of Surrey, United Kingdom
- 1994 USAF Phillips Laboratory Civilian Technology Award, Kirtland AFB, New Mexico
- 1994 Distinguished Graduate - USAF Air War College, Maxwell AFB, Alabama
- 1993 USAF General Officer Commendation for Technical Achievement, McClellan AFB, California
- 1990-98 National Research Council Post-Doctoral Mentor, Edwards AFB, California
- 1987-95 AFOSR Laboratory Mentor, Edwards AFB, California

- 1988 Outstanding Professional Performance Award, USAFIG, Edwards AFB, California
- 1982 Ohio Professional Engineering Certificate of Merit ; Highest State Score on PE
- 1982 Chemical Engineering Instructor of the Year Awards, CWRU, Cleveland, Ohio
- 1981 Chemical Engineering Instructor of the Year Awards, CWRU, Cleveland, Ohio
- 1975 National Science Foundation Research Fellowship, CWRU, Cleveland, Ohio

## 6. Professional Activities

- AIAA Advisor at Purdue University
- Member, AIAA
- Member, AOPA
- Member, Alpha Chi Sigma

## 7. Archival Works

### Journal Articles

- [1] Rusek, J. J., "The Application of Extended X-Ray Absorption Fine Structure Technique to the Study of Passive Ferrous Metal Films," M.S. Thesis, Department of Chemical Engineering, Case Western Reserve University, Cleveland, OH, May 1981.
- [2] Fine, J. M., Rusek, J. J., Eldridge, J., Kordesch, M. E., Mann, J. A., Hoffman, R.W., and Sandstrom, D. R., "Comparison of Thin Passive and Air-Oxidised Iron Films Using EXAFS and MES," *Journal of Vacuum Science and Technology A*, Vol. 1, No. 2, Part 2 (1983).
- [3] Rusek, J. J., "Synchrotron Radiation Studies of Passive Iron Films-EXAFS," Ph.D. Dissertation, Department of Chemical Engineering, Case Western Reserve University, Cleveland, OH, May 1983.
- [4] Rusek, J. J., "New Decomposition Catalysts and Characterization Techniques for Rocket-Grade Hydrogen Peroxide," *Journal of Propulsion and Power*, Vol. 12, No. 3, May-June (1996).
- [5] Rusek, J. J., "Asphaltic Thermoplastic Propellants," *Journal of Propulsion and Power*, Vol. 18, No. 4, July-August (2002).
- [6] Rusek, J. J. and Chaffee, K. P., "Property Transformation of Thermotropic Liquid Crystal Polymers," *Journal of Propulsion and Power*, Vol. 18, No. 5, September-October (2002).
- [7] Brodrecht, D. J. and Rusek, John J., "Aluminum-Hydrogen Peroxide Fuel-Cell Studies," *Applied Energy*, **74**, 2003, pp. 113-124.
- [8] Prater, D. N. and Rusek, J. J., "Energy Density of a Methanol/Hydrogen-Peroxide Fuel Cell," *Applied Energy*, **74**, 2003, pp. 135-140.

- [9] Corpening, J. H., Palmer, R.K., Heister, S.D. and Rusek, J.J., "Combustion of Advanced Non-toxic Hybrid Propellants," *International Journal of Alternative Propulsion*, Vol. 1, No. 2/3, 2007, pp. 154-173.

#### Conference Papers and Presentations

- [1] Rusek, J. J., and Mann, J. A., "The Application of the Extended X-Ray Absorption Fine Structure Technique to the Study of Passive Ferrous Metal Films," 55th Colloid and Surface Science Symposium, Case Western Reserve University, Cleveland, OH, June 1981.
- [2] Rusek, J. J., Fine, J. M., Mann, J. A., Hoffman, R. W., and Sayers, D., "Simulation of EXAFS Spectra for Layered Iron-Oxygen Compounds," 2nd National Conference on Synchrotron Radiation Instrumentation, Cornell University, Ithaca, NY, July 1981.
- [3] Rusek, J. J., Fine, J. M., Kordesch, M. E., Mann, J. A., Hoffman, R. W., and Sandstrom, D. R., "EXAFS Studies of Surface Layers on Iron Formed by In Situ Passivation or Air Oxidation," Stanford Synchrotron Radiation Laboratory User's Group Meeting, Stanford University, Stanford, CA, October 1982.
- [4] Rusek, J. J., Eldridge, J. I., Mann, J. A., and Hoffman, R.W., "Synchrotron Radiation Studies of Passive Iron Films-EXAFS," 5th Symposium of Applied Surface Analysis, University of Dayton, Dayton, OH, June 1983.
- [5] Rusek, J. J., "Thermotropic Liquid Crystal Polymers," AIAA Publication 91-3375 (1991).
- [6] Shelley, J., and Rusek, J. J., "Thermotropic Polymer Propulsion Applications," AIAA Publication 91-3376 (1991).
- [7] Rusek, J. J., "Hydrogen Peroxide for Rocket Propulsion Applications," 1995 JANNAF Joint Propulsion Meeting, Tampa, FL.
- [8] Rusek, J. J., "Cation Variance Effects in Hydrogen Peroxide Decomposition," AIAA Publication 95-3087 (1995).
- [9] Rusek, J. J., "Fire Effects on Molecular Composites: Liquid Crystal Polymers," Third International Conference on Composites Engineering, July 1996, New Orleans, LA.
- [10] Rusek, J. J., Minthorn, M. K., Purcell, N. L., Pavia, T. C., Grote, J. R., Hudson, G. C., and McKinney, B., "Non-Toxic Homogeneous Miscible Fuel Development for Hypergolic Bipropellant Engines," Sixth Annual AIAA BMDO TBMD Conference, August 1997, San Diego, CA.
- [11] Rusek, J. J., and Anderson, N., "Heterogeneous Decomposition of Rocket-Grade Hydrogen Peroxide," Presented at the First Annual International Symposium of High Test Peroxide, August 1998.
- [12] Wernimont, E., Heister, S., and Rusek, J. J., "Hybrid Motor Experiments Using Rocket-Grade Hydrogen Peroxide," Presented at the First Annual International Symposium of High Test Peroxide, August 1998.

- [13] Rusek, J. J., and Lormand, B., "Non-Toxic Hypergolic Miscible Fuels for In-situ Decomposition of Rocket-Grade Hydrogen Peroxide," Presented at the First Annual International Symposium of High Test Peroxide, August 1998.
- [14] Rusek, J. J., and Guest, B., "Containment of Rocket Propellants by Advanced Liquid Crystal Polymers," Presented at the First Annual International Symposium of High Test Peroxide, August 1998.
- [15] Rusek, J. J., Lormand, B. M., Purcell, N. L., and Pavia, T. C., "Non-Toxic Hypergolic Propellant Demonstrations," Presented at the AIAA 1998 Missile Sciences Conference, Monterey, CA, November 1998.
- [16] Rusek, John J., "Strategic Comments," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, p. 1.
- [17] Long, M. R., Beutien, T., Birkhauser, E., Remson, A., and Rusek, J., "The Characterization of the Propulsive Decomposition of Hydrogen Peroxide," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 135-154.
- [18] Funk, J. and Rusek, J., "Assessment of United States Navy Block 0 NHMF/RGHP Propellants," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 171-182.
- [19] Austin, B.L., Frolik, S., Porras, G., Etheridge, L.J., and Rusk, J.J., "Characterization of Non-toxic, Hypergolic Bi-propellants," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 189-198.
- [20] Porras, G., Wulf, S., Funk, J., and Rusek, J.J., "Non-Toxic Hypergolic Bi-Propellant Engine Design," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 299-304.
- [21] Rusek, J. J. and Heister, S. D., "Propulsion and Power Testing and Analysis Capabilities at Purdue University," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 335-343.
- [22] Kim, Y-J., VanMeter, M.G., Rusek, J., "Hydrogen Peroxide Powered Turbine Research," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 351-357.
- [23] Lim, KH, Long, M., Schultz, J. and Rusek, J., "Aluminum – Hydrogen Peroxide Fuel Cell," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 359-362.
- [24] Stein, W.B. and Rusek, J.J., "Serrano Effect Research," *Proceedings of the 2<sup>nd</sup> International Hydrogen Peroxide Propulsion Conference*, November 7-10, 1999, Purdue University, West Lafayette, pp. 363-368.
- [25] Long, M.R. and Rusek, J.J., "Substrate Characterization for the Catalytic Decomposition of Hydrogen Peroxide" *Proceedings of the 3<sup>rd</sup> International Hydrogen Peroxide Propulsion Conference*, November 13-15, 2000, National Aeronautics and Space Administration, Gulfport, Mississippi.

- [26] Matsumura, S. and Rusek, J.J., "Thermodynamic Design of an Alternative Propellant for Emergency Power Units" *Proceedings of the 3<sup>rd</sup> International Hydrogen Peroxide Propulsion Conference*, November 13-15, 2000, National Aeronautics and Space Administration, Gulfport, Mississippi.
- [27] Frolik, S., Palmer, K. and Rusek, J.J., "Development of Hypergolic Liquid Fuels for Use With Hydrogen Peroxide" *Proceedings of the 3<sup>rd</sup> International Hydrogen Peroxide Propulsion Conference*, November 13-15, 2000, National Aeronautics and Space Administration, Gulfport, Mississippi.
- [28] Rusek, J.J., "Future of Hydrogen Peroxide for Space Propulsion and Power Applications" *Proceedings of the First International Conference on Green Propellants for Space Propulsion*, June 20-22, 2001, European Space Agency, Noordwijk, The Netherlands
- [29] Heister, S.D. and Rusek, J.J., "Development of a Design/Build/Test Course in Rocket Propulsion" *Proceedings of the First International Conference on Green Propellants for Space Propulsion*, June 20-22, 2001, European Space Agency, Noordwijk, The Netherlands
- [30] Pourpoint, T.L. and Rusek, J.J., "Investigation of Homogeneous and Heterogeneous Catalysis for the Propulsive Decomposition of Hydrogen Peroxide" *Proceedings of the First International Conference on Green Propellants for Space Propulsion*, June 20-22, 2001, European Space Agency, Noordwijk, The Netherlands
- [31] Lim, K.H., Brodrecht, D.J., Heister, S.D. and Rusek, J.J., "Alloying Effects in an Aluminum – Hydrogen Peroxide Semi - Fuel Cell" *Proceedings of the First International Conference on Green Propellants for Space Propulsion*, June 20-22, 2001, European Space Agency, Noordwijk, The Netherlands
- [32] Prater, D.N. and Rusek, J.J., "Systematic Examination of a Direct Peroxide Aqueous Methanol Fuel Cell" *Proceedings of the First International Conference on Green Propellants for Space Propulsion*, June 20-22, 2001, European Space Agency, Noordwijk, The Netherlands
- [33] Miller, D.O. and Rusek, J.J., "Electrocatalysis in Hydrogen Peroxide Fuel Cells" *Proceedings of the First International Conference on Green Propellants for Space Propulsion*, June 20-22, 2001, European Space Agency, Noordwijk, The Netherlands
- [34] Brodrecht, D.J., Prater, D.N. and Rusek, J.J., "Novel Fuel Cells Using Hydrogen Peroxide" *Proceedings of the 5<sup>th</sup> International Hydrogen Peroxide Propulsion Conference*, September 15-19, 2002, Purdue University, Indiana.
- [35] Rusek, J.J., "Power and Propulsion in the United States Navy (Keynote)" *Proceedings of the 5<sup>th</sup> International Hydrogen Peroxide Propulsion Conference*, September 15-19, 2002, Purdue University, Indiana.
- [36] Pourpoint, T.L. and Rusek, J.J., "Novel Organometallic Propellants for Hypergolic Applications" *Proceedings of the 5<sup>th</sup> International Hydrogen Peroxide Propulsion Conference*, September 15-19, 2002, Purdue University, Indiana.
- [37] Rusek, J.J., "Hydrogen Peroxide for Propulsion and Power Applications: A Swift Perspective" *Proceedings of the 6<sup>th</sup> Hydrogen Peroxide Propulsion Conference*, December 2, 2003, Colorado Springs, Colorado.
- [38] Palmer, R.K. and Rusek, J.J. "Low Toxicity Reactive Hypergolic Fuels for use with Hydrogen Peroxide" *Proceedings of the 6<sup>th</sup> Hydrogen Peroxide Propulsion Conference*, December 2, 2003, Colorado Springs, Colorado.

## Technical Reports

- [1] Rusek, J. J., "Thermoplastic and Thermoplastic Elastomer-Derived Propellants," CPIA Publication 480, Volume V (1987).
- [2] Rusek, J. J., "Thermoplastic Propellants," DEA-A-76-G-1218 Annual Proceedings, Volume II (1987).
- [3] Rusek, J. J., "Characterization Methods for Novel Thermoplastic Binders," CPIA Publication 497 (1988).
- [4] Rusek, J. J., "Thermoplastic Propellants," CPIA Publication 515, Volume III (1989).
- [5] Lusby, C. A., Clark, J. H., and Rusek, J. J., "SRAM II Propellant Diagnostic Evaluation," CPIA Publication 515, Volume II (1989).
- [6] Chew, J.S.B., and Rusek, J. J., "Solid Rocket Applications for Advanced Polymers," CPIA Publication 550, Volume I (1990).
- [7] Rusek, J. J., "Proceedings of the First Annual Advanced Polymer Components Symposium," Phillips Laboratory Publication PL-TR-92-3018 (1992).
- [8] Rusek, J. J., Chaffee, K.P., and Silver, D.S., "Property Transformation of Thermotropic Liquid Crystal Polymers," CPIA Publication 580, Volume II (1992).
- [9] Chaffee, K. P., and Rusek, J. J., "Synchrotron Radiation Studies of Solid Propellants," CPIA Publication 580, Volume II (1992).
- [10] Rusek, J. J., "Thermoplastic Elastomer Propellant Synthesis," Phillips Laboratory Publication PL-TR-92-3031 (1993).
- [11] Rusek, J.J., "Proceedings of the Second Annual Advanced Polymer Components Symposium," Phillips Laboratory Publication PL-TR-92-3018, Part 2 (1994).
- [12] Rusek, J. J., "Synthesis of Thermotropic Liquid Crystal Polyesters," Phillips Laboratory Publication PL-TR-92-3018, Part 2 (1994).
- [13] Rusek, J. J., and Macler, M., "Propellant Containment Via Thermotropic Liquid Crystal Polymers," Naval Air Warfare Center Technical Publication NAWCWPNS TP 8346 (1997).

## 8. Patents

### **UOP, Inc.**

Seven filed in the fields of organic separation and inorganic catalyst synthesis.

### **Owens-Corning, Inc.**

Twenty filed in the fields of electrochemical conversion materials, rocket propellant ingredients and liquid crystal polymer synthesis.

### **United States Air Force**

One issued in the field of heterogeneous propulsive decomposition of hydrogen peroxide.

### **United States Navy**

Three filed in the field of liquid propellants and energetic materials and processes. Two patents issued.

### **Swift Enterprises, Ltd.**

One issued and seven filed in the field of advanced propulsion and power.

## **9. Graduate Student Thesis/Dissertation Major Advisor**

### *M.S. Project*

Schlabach, Michael, "Catalytic Power Study," Fall '98.

### *M.S. Thesis*

Funk, John, "Analysis of the Ignition Delay of Non-toxic Hypergolic Miscible Fuels," Spring '99.

Frolik, Steven, "Hypergolic Liquid Fuels For use with Rocket Grade Hydrogen Peroxide," Summer '00.

Long, Matthew, "Characterization of Substrate Geometries for the Catalytic Decomposition of Hydrogen Peroxide," Summer '00.

Lim, K.H. "Anodic Studies of the Aluminum – Hydrogen Peroxide Semi – Fuel Cell," Fall '01.

Brodrecht, D.J. "Parametric Studies of an Aluminum-Hydrogen Peroxide Semi-Fuel Cell," Spring '02.

Palmer, R.K. "Development and Testing of Non-Toxic Hypergolic Miscible Fuels," Spring '02

Stein, W.B. "A Theoretical Basis for Electrokinetic Propulsion," Fall '03.

### *Ph.D. Dissertation*

Funk, John, "Effects of Impingement and Shear Upon the Ignition of Hypergolic Rocket Bipropellants," Fall '03.

## **10. Educational Lectures**

1990-98 Invited Lecturer: Advanced Propulsion Materials, Air Force Institute of Technology

1987-97 Invited Lecturer: Interior and Exterior Ballistics, United States Air Force Academy

## **11. Media Articles Written about Research Work**

- Article in *THE PURDUE EXPONENT*, Thursday, November 18, 1999, page 3.
- Article in *Electric Vehicle Today*, Science & Technology Report, Wednesday, January 5, 2000.
- Article in *Industrial Environment Management*, January 2000.
- Article in *Industry Monitor*, Business Week, January 24, 2000, page 328.
- Article in Research & Development, Home Page News, February 2000.
- Article in *THE PURDUE EXPONENT*, Tuesday, February 8, 2000, page 3.
- Article in *Gannett News Service*, Friday, February 25, 2000, page A6.
- Article in *Nation & World*, February 23, 2000, page A6.
- Article in *Popular Mechanics*, February 2000.

## 12. Miscellaneous Activities

### *Music:*

- Conductor, Performer, *Jazz Test Center*, Edwards Air Force Base CA
- Leader, Performer, *Astro Blue*, Edwards Air Force Base CA
- Leader, Performer, *Polaris*, Joint Navy-Air Force Ensemble CA
- President, Muroc Musician's Society CA
- Director, Performer, *First Flight*, Recorded by Muroc Jazz, Edwards AFB CA
- Director, Performer, *Power Curve*, Recorded by Muroc Jazz, Rosamond CA
- Performer, *Corner Pocket*, West Lafayette IN

### *Aviation:*

- Active Private Pilot, Instrument Rating
- Member, Aircraft Owners and Pilots Association
- Member, Warbirds of America