
Richard O. Stroman, Ph.D.
Head, Alternative Energy Section
U.S. Naval Research Laboratory
Washington DC

EDUCATION

Ph.D. Mechanical Engineering (2013)

University of Maryland, College Park - 2013

Dissertation: "Understanding Direct Borohydride – Hydrogen Peroxide Fuel Cell Performance"

M.S. Mechanical Engineering (2002)

Pennsylvania State University, University Park – 2002

Thesis: "A Study of Capacitors for Damping Inverter Generated Ripple Currents on the Direct Current Bus: Experiment and Modeling"

B.S. Physics (2000)

Pennsylvania State University, University Park - 2000

EXPERIENCE

Section Head (2022 – Present)

U.S. Naval Research Laboratory, Alternative Energy Section

- Principal investigator (PI) investigating novel techniques to build low-cost attritable PEM fuel cells.
- Technical lead for a program developing shipboard hydrogen production and storage.
- Principal investigator developing energy-optimal mission planning tools for unmanned aircraft.

Mechanical Engineer (2005 – 2022)

U.S. Naval Research Laboratory, Alternative Energy Section

Principal investigator and/or lead engineer on programs developing hydrogen and fuel cell technologies, energy analysis and simulation tools, autonomous vehicles, and propulsion systems. Responsible for conceiving, selling, and managing research programs, leading teams of federal employees and contractors, and managing an IDIQ contract. Past and current roles include:

- PI for the IPOWER program, developing an energy simulation and analysis tool that enables acquisitions offices and others to understand how dismounted warfighters consume, store, harvest, and generate energy.
- Program and engineering lead for the Hybrid Tiger UAV program, developing an autonomous aircraft with a novel hybrid solar/fuel cell/soaring power system to achieve extremely long endurance.
- PI for a program developing energy management algorithms and techniques for swarms of unmanned logistics (delivery) aircraft.
- PI developing CFD/reacting flow simulations to improve the performance of direct borohydride fuel cells.
- Technical lead for development of a lightweight cryogenic liquid H₂ fuel storage system for UAVs. First prototype enabled a record 48 h endurance flight of the NRL Ion Tiger UAV in 2013.
- Lead for standing up a R&D laboratory for 100 kW scale fuel cells and vehicle propulsion systems.
- Lead systems engineer and flight test support for the Ion Tiger fuel cell powered UAV, which set a flight endurance record of 26 h in 2009.

Mechanical Engineer (2004 – 2005)

Geo-Centers, Inc.

Technical lead and design engineer supporting payload development for the DragonEye UAV. Designed electromechanical components for a novel short-wave infrared zoom lens and integrated the completed camera system with a DragonEye UAV. Flew DragonEye UAVs for demonstrations and payload evaluations.

Mechanical Engineer

(2003 – 2004)

ILC Dover, Inc.

Engineering research for NASA contractor. Designed, built, and demonstrated a novel inflatable rigidizable repair system for Space Shuttle wing tiles. Developed spacesuit glove heater concepts and then fabricated and evaluated proof-of-concept devices. Analyzed the thermal performance of a new spacesuit cooling system (LCVG).

Graduate Research Assistant, Electrical Engineering Department

(2000 – 2002)

Pennsylvania State University, University Park

INTELLECTUAL PROPERTY

Patents Awarded and Patent Applications

1. Stroman, R. O.; Edwards, D.; Langelaan, J.; Bird, J.; Dobrokhodov, V.; “Method for identifying optimal vehicle paths when energy is a key metric or constraint”, U.S. Patent 11,029,168 **issued June 8, 2021**. [Navy Case 107,658]
2. Stroman, R. O.; Leadbetter, E.; Buesser, C.; Swider-Lyons, K. E.; “Method for estimating the time-varying energy balance of a collection of energy sinks, harvesters, and storage devices”, U.S. Patent 10,936,035 **issued March 2, 2021**. [Navy Case #105,724]
3. Gould, B. D.; Rodgers, J.; Stroman, R. O.; Hazard, M.; “Stackless Fuel Cell”, U.S. Patent 10,868,320 **issued December 15, 2020**. [Navy Case #103,173]
4. Stroman, R. O.; Lyons, K. S.; Page, G.; Schuette, M. Air independent hydrogen fuel cell for undersea power generation. Submitted September 2019. [IEB approved, AUG 2020]
5. Stroman, R. O.; Schuette, M. W.; Swider-Lyons, K. E.; “Lightweight Zero Ullage Cryogenic Fuel Tank”, 2015. [Navy Case #103,138]
6. Swider-Lyons, K.E.; Foch, R.; Schuette, M.; Page, G.; Kahn, A.; Stroman, R. O.; “Hydrogen Fuel Cell Propulsion System”, 2011. [Navy Case #100,441]

PUBLICATIONS

Refereed Journal Articles

1. Atkinson, R. W. III; Hazard, M. W.; Rodgers, J. A.; Stroman, R. O.; Gould, B. D. “Influence of Gas Diffusion Media Compression on Open-Cathode Fuel Cells”. *J. Electrochem. Soc.* 2019, 166, F926-F934. [18-1231-4462]
2. Hjelm, R. M. E.; Lafforgue, Clémence; Atkinson, R. III; Garsany, Y.; Stroman, R. O.; Chatenet, M.; Swider-Lyons, K. “Impact of the Anode Catalyst Layer Design on the Performance of H₂O₂-Direct Borohydride Fuel Cells”. *J. Electrochem. Soc.* 2019. [19-1231-0326]
3. R. W. Atkinson III, M. W. Hazard, J. A. Rodgers, R. O. Stroman, and B. D. Gould, “Influence of Cathode Gas Diffusion Media Porosity on Open-Cathode Fuel Cells”, *Journal of the Electrochemical Society*, 165, F1002-F1011 (2018).
4. R. W. Atkinson III, M. W. Hazard, J. A. Rodgers, R. O. Stroman, and B. D. Gould, “An Open-Cathode Fuel Cell for Atmospheric Flight”, *Journal of the Electrochemical Society*, 164, F46-F54 (2016).
5. R. O. Stroman, M. W. Schuette, K. Swider-Lyons, J. A. Rodgers, and D. J. Edwards, “Liquid hydrogen fuel system design and demonstration in a small long endurance air vehicle”, *International Journal of Hydrogen Energy*, 39, 11279-11290 (2014).
6. R. O. Stroman, G. S. Jackson, Y. Garsany, and K. Swider-Lyons, “A calibrated hydrogen-peroxide direct-borohydride fuel cell model”, *Journal of Power Sources* 271, 421-430 (2014).
7. R. O. Stroman and G. S. Jackson, “Modeling the Performance of an Ideal NaBH₄ – H₂O₂ Direct Borohydride Fuel Cell”, *Journal of Power Sources* 247, 756-769 (2014).
8. O. Baturina, Y. Garsany, K. Swider-Lyons, B. D. Gould, R. O. Stroman, A. Korovina, P. Northrup, “Products of SO₂ Adsorption on Fuel Cell Electrocatalysts by Combination of Sulfur K-Edge XANES and Electrochemistry”, *Langmuir*, 27, 14930-14939 (2011).
9. E. Furman, S. Zhang, N. Kim, T. R. Shrout, H. Hofmann, R. O. Stroman and M. Lanagan, “High-Temperature, High-Power Capacitors: the Assessment of Capabilities”, *SAE Int. J. Aerospace*, 1, 822-831 (2009).

Books and Book Chapters

1. R.O. Stroman and G.S. Jackson, "Transport in Liquid-Phase Electrochemical Devices," in *Springer Handbook of Electrochemical Energy*, Springer, Berlin, (2016).

Conference Proceedings

1. Hjelm, R. M. E.; Garsany, Y.; Atkinson, R. W.; Stroman, R. O.; Swider-Lyons, K; Lafforgue, C.; Chatenet, M. "Sodium Borohydride Oxidation on Pt and/or Pd-Based Electrodes in Hydrogen Peroxide Direct Borohydride Fuel Cells (H₂O₂-DBFCs)". *232nd Meeting of the Electrochemical Society*, Washington, DC, October 1-5, (2018).
2. R. O. Stroman, D. J. Edwards, S. Carter, D. Newton, S. Heinzen, T. Young, M. Kelly, P. Jenkins, J. Bird, J. Langelaan, and V. Dobrokhodov, "The Hybrid Tiger: A Long Endurance Solar/Fuel Cell/Soaring Unmanned Aerial Vehicle", *Proc. of 48th Power Sources Conference*, Denver CO, (2018). [18-1231-2143]
3. R. O. Stroman, C. Buesser, E. Leadbetter, J. Collazo, and D. Milliken, "IPOWER: Dismounted Soldier Energy Analysis and Mission Planning Tools", *Proc. of 48th Power Sources Conference*, Denver CO, (2018).
4. R. W. Atkinson III, Y. Garsany, J. A. Rodgers, M. W. Hazard, R. O. Stroman, and B. D. Gould, "Influence of Cathode Catalyst Layer Ionomer on Air-Cooled, Open-Cathode Fuel Cells," *ECS Transactions*, 80 (8) 461-475 (2017).
5. R. M. E Hjelm, Y. Garsany, R. W. Atkinson III, R. O. Stroman, K. Swider-Lyons, C. Lafforgue, and M. Chatenet, "Sodium Borohydride Oxidation on Pt and/or Pd-Based Electrodes in Hydrogen Peroxide Direct Borohydride Fuel Cells (H₂O₂-DBFCs)," *ECS Transactions*, 80 (8) 1033-1042 (2017).
6. R. W. Atkinson III, M. W. Hazard, J. A. Rodgers, R. O. Stroman, and B. D. Gould, "Gas Diffusion Media for Open-Cathode Fuel Cells in Atmospheric Flight," *ECS Transactions*, 75 (14) 531-545 (2016).
7. R. O. Stroman, D. J. Milliken, E. A. Leadbetter, K. Swider-Lyons, J. Novoa, "Energy-Informed Soldier Mission Planning Through Simulation," *Proc. of 47th Power Sources Conference*, Orlando FL, (2016).
8. R. O. Stroman, W. Adams, K. Sullivan, J. Palmisano, R. Schur, K. Swider-Lyons, A. C. Schultz, "Autonomous Vehicles Achieving Long Endurance through Collaboration," *Proc. of 47th Power Sources Conference*, Orlando FL, (2016).
9. B.D. Gould, M.W. Hazard, J.A Rodgers and R.O. Stroman, "An Open-Cathode Fuel Cell for Atmospheric Flight," *ECS Transactions*, 69 (17) 497-507 (2015).
10. R. O. Stroman and G. S. Jackson, "Understanding Direct Borohydride – Hydrogen Peroxide Fuel Cell Performance with a Calibrated Numerical Model", *ECS Transactions*, 64 (3) 989-998 (2014).
11. K. E. Swider-Lyons, R. O. Stroman, J. A. Rodgers, B. Gould, J. Mackrell, M. Schuette, and G. Page, "Hydrogen Fuel Cells for Small Unmanned Air Vehicles", *ECS Transactions*, 64 (3) 963-972 (2014).
12. R. O. Stroman, G. S. Jackson, Y. Garsany, and K. Swider-Lyons, "A Calibrated Direct Borohydride – Hydrogen Peroxide Fuel Cell Model", 2013 12th Fuel Cell Science, Engineering & Technology Conference at the Annual Meeting of the *American Society of Mechanical Engineers*, Boston MA (2014).
13. R. O. Stroman, M. W. Schuette, K. Swider-Lyons, J. Rodgers and D. J. Edwards, "Design and Demonstration of a Liquid Hydrogen Storage System for Small Air Vehicles", 12th Fuel Cell Science, Engineering & Technology Conference at the Annual Meeting of the *American Society of Mechanical Engineers*, Boston MA (2014).
14. K. Swider-Lyons, R. O. Stroman, J. Rodgers, D. Edwards, J. MacKrell, M. Schuette and G. Page, "Liquid Hydrogen Fuel Systems for Small Unmanned Air Vehicles", *Proceedings of the 51st AIAA Aerospace Sciences Meeting* (2013).
15. R. O. Stroman and J. S. Jackson, "Modeling the Performance Limits of a Direct Borohydride Fuel Cell", 2013 11th Fuel Cell Science, Engineering & Technology Conference at the Annual Meeting of the *American Society of Mechanical Engineers*, Minneapolis MN (2013).
16. R. O. Stroman, M. Schuette, "Design Challenges and Modeling for an Efficient Liquid Hydrogen Storage Tank for Autonomous Systems", Annual Meeting of the *American Institute of Chemical Engineers*, Minneapolis MN (2012).
17. K. Swider-Lyons, R. O. Stroman, G. S. Page, J. F. Mackrell, J. A. Rodgers, M. W. Schuette, "The Ion Tiger Fuel Cell Unmanned Air Vehicle", *Proc. of the 44th Power Sources Conference*, 25.4, pp. 561-563, Las Vegas NV, (2010).
18. I. Peek, R. O. Stroman, K. Swider-Lyons, M. Schuette, G. Page, "Investigation of the Efficiencies of an Integrated PEM Fuel Cell System Operating in a Naval Environment", *43rd Power Sources Conference*, Philadelphia PA, (2008).

19. R. O. Stroman, A. D. Kahn, “Development and Integration of Controls for a PEMFC Powered Aircraft”. *ECS Transactions*, 11 (1) 1493-1504 (2007).
20. R. O. Stroman, J. C. Kellogg, K. Swider-Lyons, “Testing of a PEM Fuel Cell System for Small UAV Propulsion”, *42nd Power Sources Conference*, Philadelphia PA (2006).
21. K. Splawn, D. Graziosi, R. O. Stroman, “Phase VI Glove TMG Evolution”, *SAE 34th International Conference on Environmental Systems (ICES)*, Colorado Springs CO (2004).
22. H. Hofmann, R. O. Stroman, M. Lanagan, “Closed-Form Frequency Model of 3-Phase Inverter Drive for DC Distribution System Analysis”, *SAE International Power Systems Conference*, Coral Springs FL, (2002).

Invited Talks

1. R.O. Stroman, “Energy Analysis with IPOWER”, Briefing to ASN RDA/DASN (RDT&E), Operational Energy office Workshop on Modeling and Simulation to Support eKPPs, Pentagon Conference Center, 20 September 2022.
2. R.O. Stroman, “Shipboard H₂ Production and Storage”, OSD Operations Workshop, Johns Hopkins Applied Physics Laboratory, 6 July 2022
3. M. Medieros and R.O. Stroman, “Selected Recent & Upcoming H₂ Projects: Infrastructure and Applications”, Navy Operational Energy Forum, Virtual, 2 February 2022.
4. R.O. Stroman, “IPOWER: A dismounted warfighter energy simulation and analysis tool”, Briefing to Army Modelling and Simulation Organization Close Combat Infantry Working Group, Virtual, 12 January 2022.
5. R. O. Stroman, “Operating Energy Systems More Intelligently”, DoD Power and Energy Summit, National Harbor MD, 15 July 2021.
6. R. O. Stroman, “Long Range Long Dwell UxVs”, Navy Operational Energy Forum, Virtual Meeting, 15 January 2021.
7. R. O. Stroman and C. Buesser, “Overview of IPOWER: An Energy Simulation Tool for Dismounted Warfighters”, NATO LCG DSS Power Team of Experts Spring Meeting, Melbourne Australia, 4 March 2019.
8. R. O. Stroman and C. Buesser, “IPOWER: An Energy Simulation Tool for Dismounted Warfighters”, Naval Postgraduate School Seminar, Systems Engineering Department, Monterey CA, 8 November 2018.
9. D. J. Edwards, R. O. Stroman, "The Hybrid Tiger: A Long Endurance Solar/Fuel Cell/Soaring Unmanned Aerial Vehicle", Oak Ridge National Laboratory, Oak Ridge, TN, 11 October 2018.
10. D. J. Edwards, R. O. Stroman, "NRL Power and Energy Research for Group 1/2 UAS", Defense Energy Seminar, Naval Postgraduate School, Monterey, CA, 24 August 2018.
11. R. O. Stroman and D. J. Edwards, "The Hybrid Tiger: A Long Endurance Solar/Fuel Cell/Soaring Unmanned Aerial Vehicle", Department of Energy Hydrogen and Fuel Cells Program Annual Merit Review and Peer Evaluation Meeting, Inter-Agency Panel, Washington DC, 14 June 2018.
12. R. O. Stroman, “Selected Energy and Autonomy Research at the US Naval Research Laboratory”, Colloquium Talk, Colorado School of Mines, Golden CO. 3 November 2017.
13. R. O. Stroman and D. Edwards, “The Hybrid Tiger: A Long Endurance Solar/Fuel Cell, Soaring Unmanned Air Vehicle”, NREL/DoD Tech Exchange, National Renewable Energy Laboratory, Golden CO, 2 November 2017.
14. R. O. Stroman, K. E. Swider-Lyons, Y. Garsany, and G. Jackson, “Direct Borohydride Fuel Cells and Liquid Hydrogen Storage for Unmanned Vehicle Applications,” Xerox PARC, Palo Alto CA, 30 March 2017.
15. R. O. Stroman, “Selected Energy and Autonomy Research at the US Naval Research Laboratory”, Department of Chemical Engineering Graduate Research Seminar, University of Kansas, Lawrence KS, 25 April 2017.
16. R. O. Stroman, “Fuel Cell Power Systems for Naval Applications,” Department of Mechanical Engineering, U.S. Naval Academy, Annapolis MD, 1 April 2015.
17. R. O. Stroman, “Fuel Cell Powered UAV Programs at the Naval Research Laboratory”. University of Maryland Mechanical Engineering Department Graduate Student Seminar, College Park MD, 29 July 2008.

NRL Formal Reports

1. Stroman, R. O.; Netwall, C.; Schroer, A.; Shipboard Hydrogen Experiment and Demonstration, NRL Formal Report, NRL/6170/FR—2022/2, May 25, 2022.

2. Stroman, R. O.; Stearns, S.; Kelly, M.; Young, T.; Rodgers, J. A.; Jenkins, P.; Scheiman, D.; Edwards, D. J.; Carter, S. V.; Dobrokhodov, V.; Langelaan, J.; Bird, J.; Final Report of the Hybrid Tiger Long Endurance Solar / Fuel Cell / Soaring UAS Project, NRL Formal Report, IR-6173-21-28-U, March 28, 2022.
3. Stroman, R. O.; Edwards, D. J.; Newton, D.; Kelly, M.; Carter, S.; Reinecke, P. A.; Dobrokhodov, V.; Langelaan, J.; Bird, J.; “Energy Management and Optimization Software Developed for the Hybrid Tiger Fuel Cell / Solar / Soaring Unmanned Air Vehicle”, NRL Formal Report, NRL/FR/6113—20-10,407, August 12, 2021.
4. Stroman, R. O.; Edwards, D. J.; Carter, Sam V.; Kelly, M.; “HTSim: A Simulation Tool for Energy Harvesting Aircraft with Hybrid Powertrains”, NRL Formal Report, NRL/FR/6113—19-10,355, January 29, 2021.
5. Edwards, D. J.; Stroman, R. O.; Gould, B.; Jenkins, P.; “Continuous Operation of a UAV without Logistics Fuel”; NRL Formal Report, NRL/FR/5712—19-10,366, July 21, 2019.
6. Stroman, R.O.; Edwards, D.; Newton, D.; “A Hardware-In-the-Loop Simulation for Long Endurance Fuel Cell / Solar / Soaring Aircraft”, NRL Formal Report, NRL/FR/6113—19-10,338, July 28, 2019.
7. Stroman, R.O.; Schuette, M.; Swider-Lyons, K.; Rodgers, J. D.; Edwards, D.; “Liquid Hydrogen Storage for UAVs: Final Report of the Ion Tiger Cryogenic Fuel Tank Program”, NRL Formal Report, NRL/FR/6113—14-10,252, August 23, 2014.

Selected NRL Memorandum Reports

1. Stroman, R. O.; Carter, R.; Busser, C. J.; Somes, B. D.; Amtmann, J.; Hayman, D.; Battery Modeling and Simulation in IPOWER, NRL Memorandum Report, NRL/6170/MR— 2022/7, September 8, 2022.
2. Stroman, R. O.; Busser, C. J.; Somes, B. D.; Amtmann, J.; IPOWER 4.2.0 Step-By-Step Guide, NRL Memorandum Report, NRL/MR/6170— 2022/1, January 11, 2022.
3. Stroman, R. O.; Schroer, A.; Netwall, C.; Swider-Lyons, K.; “An Experiment Evaluating the Feasibility of Hydrogen Production to Support Tactical Operations”, NRL Memorandum Report, NRL/MR/6113—20-10,173, (2020).
4. Stroman, R. O., “An IPOWER Analysis of MARSOC Missions and Equipment from an Energy Perspective”; NRL Memorandum Report, NRL/MR/6113—20-10,115, (2020).
5. R. O. Stroman, E. Leadbetter, and C. Buesser, “IPOWER: Energy Analysis and Mission Planning Tools for Dismounted Soldiers”, NRL Memorandum Report NRL/MR/6110—18-9781, (2018).
6. R. O. Stroman and K. E. Swider-Lyons. “Soldier Power Simulation Program – Year 2 Report,” NRL Memorandum Reports, NRL/MR/6113–16-9688, (2016).
7. R. O. Stroman and K. Swider-Lyons, “Soldier Power Simulation Program – Year 1 Final Report”, NRL Memorandum Reports, NRL/MR/6113–15-9616, (2015).
8. R. O. Stroman, “Understanding Direct Borohydride-Hydrogen Peroxide Fuel Cell Performance”, University of Maryland PhD Dissertation, 316p, (2014).
9. R. O. Stroman, M. W. Schuette and G. S. Page, “Cooling System Design for PEM Fuel Cell Powered Air Vehicles”, NRL/MR/6110—10-9253, (2010).
10. R. O. Stroman, “Mechanical Design Report, DARPA BOSS Program”, NRL/MR/6110—08-9116, (2007).
11. R. O. Stroman, “Actuator Trade Off Analysis for BOSS Camera Prototype II”, NRL/MR/6110—06-9009, (2005).

Other Technical Reports

1. Stroman, R. O.; Schroer, A.; Netwall, C.; Ketcham, M.; Greco, M.; “Hydrogen System Operations”, MSC Government Operations Safety Management Plan, Approved July 7, 2021.
2. A. Flynn, D. Cylinder, M. Dickinson, W. Dickson, M. Peek, K. Hall, S. Lebental, S. Morris, V. Tate, W. Sandberg, R. Ramamurti, J. Geder, A. Stux, K. Swider-Lyons, R. Stroman, S. Crary, R. Carter, P. Von Behrens, R. Playter, and N. Cornelius, “Flapping Nano Air Vehicles”, DARPA Nano Air Vehicle Program Phase I Report, 2009.

Oral Presentations at Conferences and Workshops

1. R.O. Stroman, “Operating Energy Systems More Intelligently”, DoD Power and Energy Summit, National Harbor MD, July 15, 2021. [17-1231-3539] [18-1231-2143]

2. R.O. Stroman, “Long Range Long Dwell UxVs”, Navy Operational Energy Forum, Virtual Meeting, January 15, 2021.
3. R. O. Stroman, “Hybrid Tiger Fuel Cell / Solar / Soaring UAV”, Briefing OECIF FY21 Technology Exchange, Virtual Meeting, 19 April 2021.
4. R. O. Stroman, “The Way Ahead for IPOWER: Solutions and Opportunities for the Marine Corps”, USMC E2O Planning Tool Summit, Quantico VA, 22 June 2021.
5. R. O. Stroman and M. Huffman, “Advanced UXV Remote Autonomous Sustainment (AURAS)”, Brief at OECIF Technology Exchange, Pentagon, 6 September 2018.
6. R. O. Stroman and D. J. Edwards, “Multi-Day Endurance ISR Group 2 UAS Hybrid Tiger”, Brief at OECIF Technology Exchange, Pentagon, 6 September 2018.
7. R. Walters, D. Edwards, R. O. Stroman, and P. Jenkins, “UAS Solar-Soaring Program”, Unmanned Aircraft Systems East, Arlington VA, 7-8 November 2017.
8. R. O. Stroman, D. Edwards, P. Jenkins, R. Walters, S. Carter, and D. Newton, “The Hybrid Tiger: A Long Endurance Solar/Fuel Cell/Soaring Unmanned Air Vehicle”, American Society of Mechanical Engineers International Mechanical Engineering Conference and Exposition, Tampa FL, 7 November 2017.
9. R. O. Stroman, D. J. Edwards, S. Carter, D. Newton, S. Heinzen, T. Young, M. Kelly, P. Jenkins, J. Bird, J. Langelaan, and V. Dobrokhodov, “The Hybrid Tiger: A Long Endurance Solar/Fuel Cell/Soaring Unmanned Aerial Vehicle”, *48th Power Sources Conference*, Denver CO, 13 June 2018. [18-1231-2143]
10. R. O. Stroman, C. Buesser, E. Leadbetter, J. Collazo, and D. Milliken, “IPOWER: Dismounted Soldier Energy Analysis and Mission Planning Tools”, *Proc. of 48th Power Sources Conference*, Denver CO, (2018).
11. R. W. Atkinson III, Y. Garsany, J. A. Rodgers, M. W. Hazard, R. O. Stroman, and B. D. Gould, “Influence of Cathode Catalyst Layer Ionomer on Air-Cooled, Open-Cathode Fuel Cells,” *232nd Electrochemical Society Meeting*, 3 October 2017.
12. R. M. E Hjelm, Y. Garsany, R. W. Atkinson III, R. O. Stroman, K. Swider-Lyons, C. Lafforgue, and M. Chatenet, “Sodium Borohydride Oxidation on Pt and/or Pd-Based Electrodes in Hydrogen Peroxide Direct Borohydride Fuel Cells (H₂O₂-DBFCs),” *232nd Electrochemical Society Meeting*, 3 October 2017.
13. R. O. Stroman, E. Leadbetter, C. Buesser, J. Collazo, and D. Milliken, “IPOWER: Energy-Informed Soldier Mission Planning Through Simulation,” NDIA Joint Service Power Expo, Virginia Beach VA, 2-4 May 2017.
14. R. O. Stroman, K. Swider-Lyons, J. Palmisano, M. Diaz, and G. Knizhnik, “Collaborative Autonomous Ground Vehicles Achieving Energy Independence”, NDIA Joint Service Power Expo, Cincinnati OH, 25-27 August 2015.
15. R. O. Stroman and K. Swider-Lyons, “Improving Soldier Power System Performance through Simulation” NDIA Joint Service Power Expo, Cincinnati OH, 25-27 August 2015.
16. R. O. Stroman, “Understanding Direct Borohydride-Hydrogen Peroxide Fuel Cell Performance”, Doctoral Dissertation Defense, University of Maryland, College Park MD, 11 November 2013.
17. R. O. Stroman and G. S. Jackson, “A Design Focused Direct Borohydride Fuel Cell Model”, 2012 Fuel Cell Seminar, Uncasville CT, 5-8 November 2013.
18. K. Swider-Lyons and R. O. Stroman, “Hydrogen Fuel Cells for Small Long Endurance Unmanned Air Vehicles”, NSCB Forum at the National Reconnaissance Office, Chantilly VA, 16 July 2013.
19. O. Baturina, Y. Garsany, K Swider-Lyons, B. Gould, R. O. Stroman, A. Korovina, P. Northrup, SO₂ Adsorption on Pt Nanoparticles as a Function of Electrode Potential and Oxidative Properties of Carrier Gas: In-Situ Sulfur K-edge Xanes Approach , *4th International Congress on Operando Spectroscopy*, Upton NY, 29 April – 3 May 2012.

Poster Presentations

1. Stroman, R. O.; Buesser, C.; Somes, B.; Amtmann, J.; *IPOWER: Guiding Energy Solutions for Dismounted Warfighters*; Pentagon Energy Expo, 21-22 September 2022. Briefed to Hon. ASN Berger.
2. Stroman, R. O.; Buesser, C.; Somes, B.; Amtmann, J.; Dobrokhodov, V.; Craparo, E.; *Energy-Optimal UAS Flights Guided by LINK & POTION*; Pentagon Energy Expo, 21-22 September 2022. Briefed to Hon. ASN Berger.
3. Stroman, R. O.; Medeiros, M.; *Refueling and Servicing Package – Communications and Situational Awareness (RASP CASA)*; Pentagon Energy Expo, 21-22 September 2022. Briefed to Hon. ASN Berger.

4. Stroman, R. O.; Heinzen, S.; *Hybrid Tiger Fuel Cell/Solar/Soaring UAS*; Pentagon Energy Expo, 21-22 September 2022.
5. R. O. Stroman, E. Leadbetter, J. Collazo, C. Buesser, and D. Milliken, *iPOWER: Energy-Informed Soldier Mission Planning through Simulation*, Defense Innovation Summit, Tampa FL, 3-4 October 2017.
6. R. O. Stroman, D. Edwards, R. Walters, and A. Reinecke, *The Hybrid Tiger Unmanned Air Vehicle: Long Endurance Solar, Fuel Cell, and Autonomous Soaring*, Defense Innovation Summit, Tampa FL, 3-4 October 2017.

AWARDS

1. 2021 NRL Technology Transfer Award for the IPOWER warfighter energy simulation and analysis tool.
2. 2021 NRL Edison Patent Award for U.S. Patent 10,936,035.
3. NRL Edison Memorial Training Program, 2007-2013.