

DANIEL A. LOWY, PH.D.



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RESEARCH INTEREST

- Building microbial fuel cells and investigating their kinetics and the electrocatalytic effects exerted by newly designed or modified anode materials
- Deploying pilot plant benthic microbial fuel cells Devising and characterizing high charge capacity primary and secondary ultrathin batteries, based on zinc-Ru (IV) oxide chemistry
- Developing and testing hybrid power sources that combine galvanic cells and supercapacitors
- Improving zinc, magnesium, or metal alloy-based seawater semi-fuel cells for achieving high charge capacity and an extended operation time
- Electro-organic synthesis and scale-up of the technological process
- Highly knowledgeable about the electroreduction of activated olefins and carbon dioxide
- Experienced in surface modification with self-assembled monolayer and ionic multilayer systems (layer-by-layer deposition)
- Water desalination based on sequestering alkali ions by crown ethers confined to the electrode surface
- Electrochemistry of water-soluble gold nanoclusters
- Properties and applications of electroactive phospholipids vesicles
- Devising miniaturized reference electrodes for voltammetric and potentiometric applications in aqueous, mixed aqueous-organic and organic media.



EDUCATION

Ph.D. Analytical Chemistry, West Virginia University, Morgantown, WV, 1996 (Title: *Two-Terminal Voltammetric Sensors*, Advisor: Prof. Harry of Finklea)

Ph.D. Physical Chemistry, Babes-Bolyai University, Cluj, Romania, 1991 (Title: *The Non-Dimerizing Electroreduction of Activated Olefins*, Advisor: Prof. Liviu Oniciu)



PROFESSIONAL EXPERIENCE

VALOR HUNGARIAE Zrt, 4 Nagysándor József Street, H-1054 Budapest

- Director of Science and Innovation

FlexEI, LLC, 387 Technology Drive, College Park, MD 20742-3371

- Senior Scientist, February 2010-Present

NOVA University, Alexandria Campus, 3001 Beauregard Street, Alexandria, VA 22311

- Adjunct Professor, January 2005 - December 2017

Montgomery College, Rockville, MD

- Adjunct Professor, January - December 2017

Community Colleges of Baltimore County, Catonsville, MD

- Adjunct Professor, January - December 2017

BAE Systems, 810 Wyman Park Drive, Baltimore, MD 21211

- Senior Electrochemist, August 2000-February 2010

Naval Research Laboratory, CBMSE - Code 6900, Washington, DC 20375 (employed via Nova Research, Inc., Alexandria, VA 22308)

- Sr. Scientist, August 2000 – August 2008

The University of Memphis, Memphis, TN

- Assistant Professor, Chemistry, 1997-2002
- Visiting Assistant Professor, Chemistry, 1996-1997

West Virginia University, Morgantown, WV

- Research and Teaching Assistant, Chemistry, 1991-1996



SPONSORED PROJECTS

- Initiated a project of powering commodities, which received \$6 M in corporate funding (2011-2014)
- As the Principal Investigator led a project for developing a sea water battery, which received \$980 k from NavAir/U.S. Department of Navy



EXPERIENCE

- Instructed Organic Chemistry and Organic Chemistry Laboratory, College Chemistry I and II (with related laboratory courses), Quantitative Analysis, Instrumental Analysis, Reaction Kinetics, and Surface Modifications.



SUMMARY OF PUBLICATIONS AND CITATIONS:

Papers in ISI journals: 80 with over **2000** citations

Most cited paper: **400+** citations; 2nd most cited: **200+** citations; 3rd cited: **165** citations;
4th most cited: **162** citations; 5th most cited: **160** citations

Patents: 8 (5 RO + 2 USA + 1 International)

H value: 18, Average citation number: **>24**

Books: 2, Book Chapters: **9**, Referenced Conference Publications: **15 (20 citations)**

National and International Conference Presentations: **70**

Invited Talks: **6**, Presentations at Universities and in Industry: **17**

Presentation Authored with Students: **35**

Research Reports and White Papers: **32**



AWARDS

- Nicolae Teclu Prize of the Romanian Academy of Sciences (1987)
- Alan Berman Award for best Scientific Publication, U.S. Naval Research Laboratory (2003)
- Honors Diploma for Outstanding Service to Education, Northern Virginia Community College Alumni Federation (2006)
- Honors Diploma for Outstanding Service to Education, Northern Virginia Community College Alumni Federation (2014)
- Diploma of Completion Phase II NavAir Project, U.S. Department of Navy (2015)
- Five Years' Service Award, FlexEI, LLC (2015)
- Editor of *Research & Reviews: Journal of Material Sciences* (since 2016)



EXPERIENCE IN R & D AND MANAGEMENT

- Managed a project funded by the U.S. Navy (NavAir) over a period of 4 years (2013-2017), with a budget totaling close to \$1 M
- The project made it from Phase I (TRL 1) and Phase Ib (TRL 2/3) to Phase II (TRL 5/6) and Phase II Options (TRL 7/8)
- Was in charge with coordinating the interdisciplinary work of chemists, chemical engineers, mechanical engineers, and electrical engineers

- Monitored safety procedures and complying with University of Maryland's Hygiene Plan, 5S, and SOPs
- Initiated and supervised the acquisition of chemicals, materials, and electronic components
- Kept the project on schedule, meeting all milestones, within the allocated budget
- Provided all briefings to the Program Manager at the U.S. Navy



REVIEWER FOR SCIENTIFIC JOURNALS (SUMMARY) (A detailed list of reviews is appended)

216 reviews for peer-reviewed chemistry journals (published by Elsevier, The Royal Chemical Society, The American Chemical Society, etc.), **6** internal reviews for the U.S. Naval Research Laboratory, **1** review for MIPS – MD Industrial Partnership grant application, **1** grant review for Competence Center Energy & Mobility (CCEM.CH) – Switzerland, **1** grant review for Canadian Research Agency, and **2** reviews for social sciences.



MEMBERSHIP

Hungarian Academy of Sciences, Member of the Public Body (since 1998)
 New York Academy of Sciences (1999-2000)
 Electrochemical Society (1994-2000, 2002-2003, 2013-Present)
 Society for Electroanalytical Society (lifetime member)
 West Virginia University Alumni Association (lifetime member)
 The Transylvanian Museum Society (Erdélyi Múzeum Egyesület, EME)
 EMIL – the PEN Club of Hungarian Writers in Transylvania (Erdélyi Magyar Írók Lígája, founding member)
 PEN Club – Hungary, member of the supervisory board
 Lajos Kelemen Society for Monument Protection (Kelemen Lajos Műemlékvédő Egyesület, founding member)



PROFESSIONAL NETWORK

LinkedIn – over 7,000 connections (as of February 2019), **Research Gate**, **Academia.edu**

SELECTED PUBLICATIONS (A DETAILED LIST IS APPENDED)



Galvanic Cells

1. Stanish, I.; Lowy, D.A.; Chi-Wei Hung; Singh, A. "Vesicle-Based Rechargeable Batteries," *Adv. Mater.* **2005**, 17 (9), 1194-1198. (14 citations). (This paper was presented in nanotechweb.org journal on June 29, 2005 by Liz Kalaugher: *Vesicles Roll up for Rechargeable Batteries*. <<http://nanotechweb.org/articles/news/4/6/15/1>>, July 5, 2005)
2. Lowy, D.A.; Pătrut, A. "Nonobatteries: Decreasing Size Power Sources for Growing Technologies," *Recent Patents on Nanotechnology* **2008**, 2 (3), 208-219. (1 citation)
3. Peckerar, M.; Dornajafi, M.; Dilli, Z.; Goldsman, N.; Ngu, Y.; Boerger, B.; Van Wyck, N.; Gravelin, J.; Grenon, B.; Proctor, R. B.; Lowy, D.A. "Fabrication of Flexible Ultracapacitor/Galvanic Cell Hybrids Using Advanced Nanoparticle Coating Technology," *J. Vac. Sci. Technol. B* **2011**, 29 (1), Article Number 011008. (2 citations).
4. Peckerar, M.; Dilli, Z.; Dornajafi, M.; Goldsman, N.; Ngu, Y.; Proctor, R.B.; Krupsaw, B.J; Lowy, D.A. "A Novel High Energy Density Flexible Galvanic Cell," *Energy Environm. Sci.* **2011**, 4 (5), 1807-1812. (14 citations). This paper was advertised in *RSC Chemistry World: Carl Saxton Power sources get flexible*. <<http://www.rsc.org/chemistryworld/News/2011/April/07041101.asp>> (7/4/2011)



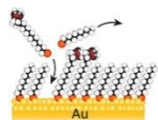
Microbial Fuel Cells:

5. Tender, L.M.; Reimers, C.E.; Lovley, D.R.; Bond, D.R.; Holmes, D.E.; Stecher, H. III, Lowy, D.A., Pilobello, K.; Fertig, S. "Buried Treasure. Microbial Power Generation on the Seafloor," *Nature Biotech.* **2002**, 20 (8), 821-825. (354 citations)
6. Lowy, D.A.; Tender, L.M.; Zeikus, J.G.; Park, D.H.; Lovley, D.R. "Harvesting Energy from the Marine Sediment-Water Interface. II. Kinetic Studies on Anode Materials," *Biosens. Bioelectron.* **2006**, 21 (11), 2058-2063. (172 citations).
7. Lowy, D.A.; Tender, L.M. "Harvesting Energy from the Marine Sediment-Water Interface. III. Kinetic Activity of Quinone and Antimony-Based Anode Materials," *J. Power Sources* **2008**, 185 (1), 70-75. (33 citations)
8. Tender, L.M.; Gray, S.A.; Grooveman, E.; Lowy, D.A.; Kauffman, P.; Helhado, J.; Tyce, R.C.; Flynn, D.; Petrecca, R.; Dobarro, J. "The First Demonstration of a Microbial Fuel Cell as a Viable Power Supply: Powering a Meteorological Buoy," *J. Power Sources* **2008**, 179 (2), 571-575. (140 citations)
9. Lowy, D.A. "Tafel Analysis and Techniques for Studying Benthic Microbial Fuel Cells," In Rabaey, K.; Angenent, L.; Schröder, U.; Keller, J. (Eds.): *Bioelectrochemical Systems. From Extracellular Electron Transfer to Biotechnological Application*. IWA Publishing, London, 2010, pp. 153-167. (ISBN: 9781843392330).



Electroreduction of Carbon Dioxide

10. Jitaru, M.; Lowy, D.A.; Toma, B.C.; Toma, M.; Oniciu, L. "The Electrochemical Reduction of Carbon Dioxide on Flat Metallic Electrodes," *J. Appl. Electrochem.* **1997**, *27*, 875-889. (136 citations). Also cited as the first reference of the electrochemical CO₂ reduction chapter in Aresta, M. (Ed.) *Carbon Dioxide Recovery and Utilization* (Dordrecht, etc.: Kluwer Academic Publ., 2003.)
11. Ohta, Kiyohisa; Kawamoto, Mituhiro; Mizuno, Takayuki; Lowy, D.A. "Electrochemical Reduction of Carbon Dioxide in Methanol at Ambient Temperature and Pressure," *J. Appl. Electrochem.* **1998**, *28*, 717-724. (17 citations)
12. Jitaru M., Lowy D. "Electroreduction of Carbon Dioxide," In Savinell, R., Ota, K., and Kreysa, G. (Ed.) *Encyclopedia of Applied Electrochemistry: SpringerReference* (www.springerreference.com). Springer-Verlag Berlin Heidelberg, 2014. pp.1-5 (DOI: 10.1007/SpringerReference_303553 2012-09-26 10:11:06 UTC)
13. Lowy D.A.; Jitaru M. "The Electroreduction of Carbon Dioxide," In KY Chan (Ed.) *Electrochemically Enabled Sustainability: Devices, Materials and Mechanisms for Energy Conservation*. (Boca Raton, Florida: CRC Press, 2014) pp. 1-50



Materials Science / Surface Modifications

14. Lowy, D.A.; Finklea, H.O. "Gold Electrodes with Polyion Multilayers and Electrostatically Bound Redox Couples," *Electrochim. Acta* **1997**, *42*, 1325-1335. (23 citations)
15. Jhaveri, S.D.; Lowy, D.A.; Foos, E.E.; Snow, A.W.; Ancona, M.G.; Tender, L.M. "Ion-Induced Discrete Charging of Immobilized Water-Soluble Gold Nanoclusters," *Chem. Comm.* **2002**, (14), 1544-1545. (15 citations)
16. Lowy, D.A.; Jhaveri, S. D.; Foos, E. E.; Tender, L. M.; Ancona, M. G.; Snow, A. W. "Effects of Ion-Pairing on Rate of Electron Transfer between Immobilized Gold Nanoclusters and Soluble Redox Probes," *Electrochem. Comm.* **2006**, *8* (12), 1821-1824.



PATENTS

1. Stanish, I.; Singh, A.; Lowy, D.A. "Biobased Microbattery," US 6,994,934 B2 Feb. 7, 2006.
2. Tender, L.M.; Lowy, D.A. "Apparatus Equipped with Metallic Manganese Anode for Generating Power from Voltage Gradients at the Sediment-Water Interface," US 7,550,224 B1 (June 23, 2009); WO/2007/094820 August 23, 2007
3. Dornajafi, M.; Proctor, R.B.; Lowy, D.A.; Dilli, Z.; Peckerar, M.C. "Zinc-Water Battery and System," U.S. 9,627, 694 April 18, 2017.