

## Nicolas E. Holubowitch, Ph.D.

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Assistant Professor of Chemistry  
Texas A&M University – Corpus Christi  
6300 Ocean Dr  
Corpus Christi, TX 78412  
Office: 361.825.2987

1021 Egyptian Dr  
Corpus Christi, TX 78412  
Phone: 520.369.1618  
nicolas.holubowitch@tamucc.edu

### EDUCATION

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Ph.D. Chemistry, Tyndall National Institute, University College Cork, Cork, Ireland	2013
M.S. Chemistry, University of Denver, Denver, CO	2008
B.S. Chemistry, College of William and Mary, Williamsburg, VA	2006

### EMPLOYMENT

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Assistant Professor of Chemistry, Texas A&M University – Corpus Christi	2018–present
Visiting Scholar, Dept. of Homeland Security Summer Research Team Program, Purdue University	2018
Professional Assistant Professor of Chemistry, Texas A&M University – Corpus Christi	2017–2018
Senior Research Scientist, Center for Applied Energy Research, University of Kentucky	2016–2017
Research Scientist Associate, Center for Applied Energy Research, University of Kentucky	2015–2016
Postdoctoral Research Fellow, Center for Applied Energy Research, University of Kentucky	2013–2015
Graduate Research Assistant, Tyndall National Institute, University College Cork	2008–2013
Graduate Research Assistant, University of Denver	2006–2008
Research Assistant, ADA-Environmental Solutions, Littleton, CO	2007
Undergraduate Research Assistant, College of William and Mary	2005

### REFEREED PUBLICATIONS

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- Holubowitch, N. E.; Omosibi, A.; Gao, X.; Landon, J. R.; Liu, K. "Membrane-free electrochemical deoxygenation of aqueous solutions using symmetric activated carbon electrodes in flow-through cells," *Electrochimica Acta*, **2019**, *297*, 163-172.
- Holubowitch, N. E.; Gao, X.; Omosibi, A.; Landon, J. R.; Liu, K. "Quasi-Steady State Polarization Reveals the Interplay of Capacitive and Faradaic Processes in Capacitive Deionization" *ChemElectroChem*, **2017**, *4*(9), 2404-2413.
- Omosibi, A.; Gao, X.; Holubowitch, N. E.; Liu, A.; Ruh, K.; Landon, J.; Liu, K. "Anion Exchange Membrane Capacitive Deionization Cells." *Journal of the Electrochemical Society*, **2017**, *164*(9): E242-E247.
- Gao, X.; Omosibi, A.; Holubowitch, N. E.; Liu, A.; Ruh, K.; Landon, J.; Liu, K. "Capacitive Deionization Using Alternating Polarization: Effect of Surface Charge on Salt Removal." *Electrochimica Acta*, **2017**, *233*, 249-255.
- Holubowitch, N. E.; Landon, J. R.; Lippert, C. A.; Weisenberger, M.; Craddock, J.; Liu, K. "Spray-coated Multi-walled Carbon Nanotube Composite Electrodes for Thermal Energy Scavenging Electrochemical Cells" *ACS Applied Materials & Interfaces*, **2016**, *8*, 22159-22167.
- Holubowitch, N. E.; Manek, S. E.; Landon, J.; Lippert, C. A.; Odom, S. A.; Liu, K. "Molten Zinc Alloys for Lower Temperature, Lower Cost Liquid Metal Batteries." *Advanced Materials Technologies*, **2016**, *1*, 1600035.
- Gao, X.; Omosibi, A.; Holubowitch, N. E.; Liu, A.; Ruh, K.; Landon, J.; Liu, K. "Polymer-Coated Composite Anodes for Efficient and Stable Capacitive Deionization." *Desalination*, **2016**, *399*, 16-20.
- Holubowitch, N. E.; Manek, S. E.; Landon, J.; Lippert, C. A.; Odom, S. A.; Liu, K. "Cathode Candidates for a New Zinc-Based Energy Storage Technology." *International Journal of Energy Research*, **2016**, *40*, 393–399.

Zheng, L.; Matin, N. S.; Thompson, J.; Landon, J.; **Holubowitch, N. E.**; Liu, K. "Understanding the Corrosion of CO<sub>2</sub>-Loaded 2-Amino-2-Methyl-1-Propanol Solutions Assisted by Thermodynamic Modeling." *International Journal of Greenhouse Gas Control*, **2016**, 54, 211-218.

Kaur, A.; **Holubowitch, N. E.**; Ergun, S.; Elliot, C. F.; Odom, S. A. "A Highly Soluble Organic Catholyte for Non-aqueous Redox Flow Batteries." *Energy Technology*, **2015**, 3(5), 476-480. (Article featured on inside front cover)

**Holubowitch N. E.**; Manek S.; Landon J.; Lippert C.; Odom S.; Liu K. "Zn-Sn Electrochemical Cells with Molten Salt Eutectic Electrolytes and Their Potential for Energy Storage Applications." *ECS Transactions*, **2014**, 64, 439-452.

**Holubowitch N. E.**; Nagle L.C.; Rohan J.F. "Porous Alumina Thin Films on Conductive Substrates for Templated 1-Dimensional Nanostructuring." *Solid State Ionics*, **2012**, 216, 110-113.

Rohan J.F.; Hasan M.; **Holubowitch, N. E.** "Nanotemplated Platinum Fuel Cell Catalysts and Copper-Tin Lithium Battery Anode Materials for Microenergy Devices." *Electrochimica Acta*, **2011**, 56(26), 9537-9541.

Bishop, G. A.; **Holubowitch, N. E.**; Stedman, D. H.; "Remote Measurements of On-Road Emissions from Heavy-Duty Diesel Vehicles in California"; Year 1, **2008**. Annual report prepared for the National Renewable Energy Laboratory (NREL).

Fikse, M. A.; Bylund W.E.; **Holubowitch N. E.**; Abelt, C.J. "Synthesis of Chlorothioformates from Xanthates." *Synthesis-Stuttgart*, **2006**, 24, 4118-4120.

*In the works:*

**Holubowitch, N. E.**; Medina, G.; Beaudoin, S. "A Quantitative Coulometric Study of Molecularly Imprinted Polymers for Electrochemically Active Analytes: Explosive Compounds as a Case Study" *In preparation*, **2019**.

## PATENTS

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**Holubowitch N. E.**; Neathery J. K.; Liu K.; Landon, J.; Lippert C. "Method for Energy Storage to Utilize Intermittent Renewable Energy and Low-Value Electricity for CO<sub>2</sub> Capture and Utilization." US 20140208753 A13, Full patent granted 03/2016.

**Holubowitch, N. E.**; Lippert, C.; Liu, K. "Low Temperature Liquid Metal Batteries (LMB) for Energy Storage Applications." (INV15/2047), *Provisional*, 01/2015.

Omozebi, A.; Gao, X.; **Holubowitch, N. E.**; Landon, J.; Cassis, L.; Liu, K. "Potential of Zero Charge Enhanced Electrode Configuration for Electrodeionization Cells" *Provisional*, 07/2016.

## ORAL PRESENTATIONS

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"Emerging Applications of Electrochemistry" *Physical and Environmental Sciences Department Seminar, Texas A&M University – Corpus Christi*, May 2018.

"Electrochemical Deoxygenation of Aqueous Solutions Using Symmetric Activated Carbon Electrodes in Flow-through Cells" *233rd Meeting of the Electrochemical Society in Seattle, WA*, May 2018.

"Advanced Capacitive Techniques for Flue Gas Desulfurization (FGD) Wastewater Process Treatment" *Carbon Management Research Group*, 2016.

"Intermediate Temperature Fuel cells" *Power Generation and Utility Fuels group at CAER*, April 2016.

"Thermocells: Turning Heat into Electricity" *1<sup>st</sup> Annual Postdoctoral Research Symposium*, University of Kentucky, June 2015.

"Multi-walled Carbon Nanotube Electrode Optimization for Thermocells" *227th Meeting of the Electrochemical Society in Chicago, IL*, May 2015.

"Scavenging Untapped Thermal Energy in Power Plants" *Carbon Management Research Group*, 2014.

"Zn-Sn Electrochemical Cells with Molten Salt Eutectic Electrolytes and Their Potential for Energy Storage Applications" *226th Meeting of the Electrochemical Society in Cancun, MX*, October 2014.

“Bi-directional DC/DC Converter Coupled with Capacitive Deionization for Efficient Desalination” *226th Meeting of the Electrochemical Society in Cancun, MX*, October 2014.

“Thermal energy-scavenging liquid thermoelectrics.” *Power Generation and Utility Fuels group at CAER*, July 18, 2014.

“Platinum alloy nanotubes for methanol fuel cells.” *220th Meeting of the Electrochemical Society in Boston, MA*, October 2011.

“Catalysts and templated nanostructuring for methanol fuel cells” *European Materials Research Society (E-MRS) Spring meeting in Nice, France*, 2011.

“Photovoltaics: A Chemical Perspective.” *Public non-thesis related seminar presentation delivered in fulfillment of graduate requirements*, Denver, CO, 2007.

## POSTER PRESENTATIONS

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“Conductive molecularly imprinted polymers for the electrochemical sensing of explosives”. **N. Holubowitch**, G. Medina, J. Wray, G. Nguyen, Q. Ton, H. Bui. *Center for Electrochemistry Annual Workshop*, University of Texas at Austin, 2019.

“Scavenging Waste Heat with Carbon Nanotubes in Thermoelectrochemical Cells”. **N. Holubowitch**, C. Lippert, J. Landon, J. Craddock, M. Weisenberger, K. Liu. *Seed Grant Research Colloquium*, Center for Applied Energy Research, 2015, and *1<sup>st</sup> Annual Postdoctoral Research Symposium*, University of Kentucky, 2015.

“Nanoscale metal and alloy electrochemical energy materials.” J.F. Rohan, **N. Holubowitch**, M. Hasan, S. Patil, A.V. Jeyaseelan, D.P. Casey, L.C. Nagle; *220th Meeting of the Electrochemical Society in Boston, MA*, 2011.

“Fast-response roadside exhaust plume remote sensing.” **Holubowitch, N. E.**; Bishop, G. A.; Stedman, D. H.; *18th CRC On-Road Vehicle Emissions Meeting in San Diego, CA*, 2008.

## TEACHING AND MENTORING EXPERIENCE

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**Texas A&M University – Corpus Christi**, Corpus Christi, TX, (Professional) Assistant Professor  
*Instrumental Analysis Laboratory (course redesign in progress)*

2017-Present

**University of Kentucky**, Lexington, KY

*Mentored and managed two undergraduate students performing independent research in electrochemistry*

2013-2014

**University of Denver**, Denver, CO

*Teaching assistant for undergraduate chemistry laboratories*

2006-2008

General Chemistry, Analysis of Equilibrium Systems, Introduction to Environmental Chemistry, and Instrumental Analysis

Lectured students on lab material, graded lab reports, mentored students out of lab, held office hours, and taught labs involving a wide variety of chemical and analytical techniques (titrations, pH, calorimetry, HPLC, Mass Spec, UV-vis spectroscopies) including subsequent data analyses.

*Chemistry and mathematics tutor for local high school students, Denver, CO*

2007

## REVENUE GENERATION and AWARDS

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2019 Follow-on funding to Department of Homeland Security Summer Research Team for Minority Serving Institutions; \$50,000.

2018 Department of Homeland Security Summer Research Team for Minority Serving Institutions; travel, stipends and supplies for 10 weeks research with undergraduate student at Purdue University, approx. \$30,000.

2014 Successfully funded proposal to the Kentucky Department for Energy Development & Independence: “Waste Heat Utilization via Thermogalvanic Cells for Electricity Generation in the Carbon Capture Process”. One year, \$94,000.

2014 UK seed grant program proposal: “Waste Heat Utilization for Electricity Generation: Composite Nanocarbon Materials for Thermal Energy Harvesting”, *Funded*. Six months and \$25,000.

2011 Electrodeposition division student travel grant awarded for 220th ECS Meeting (\$750)  
2011 Dr. Bernard S. Baker Student Award for Fuel Cell Research - Honorable Mention

## RESEARCH EXPERIENCE DETAIL

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### At the **Texas A&M University-Corpus Christi**

- Electrochemistry, energy, and the environment
- Sensing of hazardous compounds

### At the **Center for Applied Energy Research**

- Specialization in developing and testing electrochemical energy conversion technologies
- Developed novel liquid metal battery technology for cogeneration of thermal and electrical energy
- Identified and characterized high power output materials for thermogalvanic thermal energy scavenging cells
- Research in capacitive deionization (CDI) for low energy desalination of brackish water

### At **Tyndall National Institute**

- Synthesized Si-supported AAO membranes for with through-hole pores for myriad applications
- Optimized templated electrodeposition of 1-dimensional (wires and tubes) platinum and platinum alloy nanostructured catalysts
- Fabricated micro-direct methanol fuel cells with above materials bridging fundamental and applied work

### At the **University of Denver**

- Investigated on-road, real-time *in operando* vehicle emissions for pollutant identification via fast-response IR absorption spectroscopy
- Modified FEAT instrumentation (developed at DU) for facile high-throughput emissions detection (NO<sub>x</sub>, CO, HC, and CO<sub>2</sub>)

### For **ADA-Environmental Solutions**

- Explored bifunctional sorbents for carbon dioxide capture in coal-fired power plants
- Engineered bench scale coal flue gas simulation system to capture CO<sub>2</sub> in a pure MEA-supported solid reactor bed

### At the **College of William and Mary**

- Investigated novel pathways in organic synthesis via the reaction of xanthates with Vilsmeier reagents.
- Characterized formates via nuclear magnetic resonance spectroscopy and thin layer chromatography

## PROFESSIONAL AFFILIATIONS

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2011–present The Electrochemical Society, member  
2009, 2019 American Chemical Society, member

## AREAS OF TECHNICAL EXPERTISE

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Electrochemical energy storage and conversion, sensors, fuel cells, battery materials characterization and cycle testing, surface chemistry and functionalization, energy scavenging, capacitive deionization, thermoelectrochemistry, molten salt and liquid metal electrochemistry, corrosion, electrodeposition, electrochemical thermodynamics

## REFEREED JOURNALS

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*Frontiers in Chemistry (Review Editor of the Editorial Board of Electrochemistry)*

*Nature*

*Journal of Physical Chemistry C*

*New Journal of Chemistry*

*International Journal of Energy Research*

*Philosophical Magazine*