



## Nathan Gallagher Brady

Graduate Teaching/Research Assistant  
Department of Biochemistry & Cellular and Molecular Biology  
The University of Tennessee Knoxville

CEO and Founder of LEAPh Biosystems, LLC.  
Creators of Light Energy Applied Photosynthetic Biosystems  
Knoxville, Tennessee, USA.

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### Education

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<b>Ph.D.</b> (2021)	Biochemistry & Cellular and Molecular Biology.
<b>B.S.</b> (2009)	Chemistry, Focus: Environmental Analytical Chemistry.
<b>Graduate</b>	<b>The University of Tennessee Knoxville.</b>
2015 - 2021	Dept: Biochemistry & Cellular and Molecular Biology, Advisor: Dr. Barry D. Bruce.
<b>Undergraduate</b>	<b>The State University of New York College of Environmental Science and Forestry (SUNY-ESF),</b> in association with Syracuse University.
2005 - 2009	Dept: Chemistry, Focus: Environmental/Analytical Chemistry, Advisor: Dr. Mark Teece

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### Publications

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4/2021	Claudio Catalano, <b>Nathan G. Brady*</b> , Barry D. Bruce, Youzhong Guo. PSI structure encapsulated within styrene maleic acid and detergent by negative stain and cryogenic electron microscopy. <i>The Biophysical Journal</i> . (Manuscript in Progress).
4/2021	<b>Nathan G. Brady*</b> , Cameron Workman, Barry D. Bruce, Brian Long. Esterifying styrene maleic acid copolymers with various alcohol ethoxylates to investigate protein extraction efficacy and selectivity. <i>Biomacromolecules</i> . (In Revision).
4/2021	<b>Nathan G. Brady*</b> , Shuo Qian, Hugh O'Neill, Barry D. Bruce. Investigating the dimensions and lipid profile of <i>Thermosynechococcus elongatus</i> photosystem I within detergent and styrene maleic acid lipid particle (SMALP) using small angle neutron scattering and tandem mass spectrometry. <i>JACS</i> . (Manuscript Available, in Progress).
12/2019	Minh D. Phan, Olena I. Korotych, <b>Nathan G. Brady*</b> et al. X-ray and neutron reflectivity studies of styrene maleic acid polymer interactions with galactolipid-rich monolayers. <i>Langmuir</i> . <a href="https://doi.org/10.1021/acs.langmuir.9b03817">https://doi.org/10.1021/acs.langmuir.9b03817</a>
12/2019	Dmitry A. Cherepanov, <b>Nathan G. Brady</b> , Ivan V. Shelaev, et al. PSI-SMALP, a detergent-free form of cyanobacterial photosystem I reveals faster femtosecond photochemistry. <i>The Biophysical Journal</i> . <a href="https://doi.org/10.1016/j.bpj.2019.11.3391">https://doi.org/10.1016/j.bpj.2019.11.3391</a>
10/2019	<b>Nathan G. Brady*</b> , Meng Li, Yue Ma, James C. Gumbart, Barry D. Bruce. Non-detergent isolation of a cyanobacterial photosystem I using styrene maleic acid alternating copolymers. <i>RSC Advances</i> . <a href="https://doi.org/10.1039/c9ra04619d">https://doi.org/10.1039/c9ra04619d</a>
9/2019	Roman A. Voloshin, <b>Nathan G. Brady*</b> , et al. Enhanced activity and stability of osmotically-stabilized thylakoids in a biohybrid solar cell. <i>International Journal of Energy Research</i> . <a href="https://doi.org/10.1002/er.4866">https://doi.org/10.1002/er.4866</a>

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\* First or co-first author.

- 11/2018 **Nathan G. Brady\***, Shuo Qian, Barry D. Bruce. Analysis of Styrene Maleic Acid Alternating Copolymer Supramolecular Assemblies in Solution by Small Angle X-ray Scattering. *Eur. Polymer Journal*. <https://doi.org/10.1016/j.eurpolymj.2018.11.034>
- 4/2018 E. Musazade, R. Voloshin, **N. Brady\*** et al. Biohybrid solar cells: Fundamentals, progress, and challenges. *Journal of Photochemistry and Photobiology C: Photochemistry Reviews*. <https://doi.org/10.1016/j.jphotochemrev.2018.04.001>
- 3/2018 G.A. Venkatesan, G.J. Taylor, C.M. Basham, **N.G. Brady**, et al. Evaporation-induced monolayer compression improves droplet interface bilayer formation using unsaturated lipids. *Biomicrofluidics*. <https://doi.org/10.1063/1.5016523>
- 3/2017 R.A. Voloshin, V.S. Bedbenov, D.A. Gabrielyan, **N.G. Brady**, et al. Optimization and characterization of TiO<sub>2</sub>-based solar cell design using diverse plant pigments. *International J. of Hydrogen Energy*. <https://doi.org/10.1016/j.ijhydene.2016.11.148>

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#### Honors and Awards

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- 2/2021 **Oak Ridge National Laboratory, Innovation Crossroads Finalist – LEAPh Biosystems**
- 12/2020 **UT Research Foundation Technology Maturation Grant Winner – LEAPh Biosystems**
- 6/2020 **Boyd Venture Challenge Seed Funding Winner – LEAPh Biosystems**
- 5/2020 **James and Dora Wright Fellowship**
- 4/2020 **Boyd Venture Challenge Finalist – LEAPh Biosystems**
- 4/2020 **Cokkinias Award for Outstanding Scholarly Achievement by Graduate Student**
- 3/2020 **University of Tennessee Knoxville Graduate School Fellowship**
- 12/2019 Tennessee Plant Research Center Travel Fellowship
- 12/2019 Western Photosynthesis Conference Travel Award
- 11/2019 **Knoxville Scipreneur Challenge Pitch Competition, 1<sup>st</sup> place – LEAPh Biosystems**
- 4/2019 **4<sup>th</sup> International SMALP Conference Outstanding Speaker Award, Utrecht, NL.**
- 4/2019 **David and Becky Eaker Graduate Student Award**
- 4/2019 University of Tennessee Graduate Student Senate Travel Award
- 3/2019 Neutron Beam Award at Spallation Neutron Source, Oak Ridge National Lab
- 1/2019 Western Photosynthesis Conference Travel Award
- 11/2018 Tennessee Plant Research Center Travel Fellowship
- 9/2018 Neutron Beam Award at Spallation Neutron Source, Oak Ridge National Lab
- 1/2018 Western Photosynthesis Conference Travel Award
- 11/2017 **University of Hyderabad, India, Outstanding Achievement Award**
- 11/2017 University of Tennessee Graduate Student Senate Travel Award
- 7/2017 Beam Award at National Synchrotron Light Source II, Brookhaven National Lab
- 7/2017 Neutron Beam Award at High Flux Isotope Reactor, Oak Ridge National Lab
- 6/2017 **Penley Foundation Fellowship**
- 6/2017 Neutron Scattering Applications in Structural Biology Awardee, Oak Ridge National Lab
- 3/2017 **NSF Graduate Research Fellowship Program Honorable Mention**
- 1/2017 Neutron Beam Award at High Flux Isotope Reactor, Oak Ridge National Lab
- 1/2017 Tennessee Plant Research Center Travel Fellowship
- 1/2017 Western Photosynthesis Conference Travel Award
- 1/2017 University of Tennessee Graduate Student Senate Travel Award

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\* First or co-first author.

8/2016	International Congress on Photosynthesis Research Travel Award
1/2016	Western Photosynthesis Conference Travel Award
1/2016	University of Tennessee Graduate Student Senate Travel Award
8/2015	<b>University of Tennessee Knoxville Chancellor's Fellowship</b>

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#### Employment History

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3/2020 - Present	<b>Founder and CEO</b> , LEAPh Biosystems, LLC, Knoxville, TN. Creators of Light Energy Applied Photosynthetic Biosystems (patent pending).
8/2015 - Present	<b>Graduate Teaching Assistant</b> , University of Tennessee Knoxville, Knoxville, TN. Cellular and Comparative Biochemistry Laboratory (BCMB 419).
8/2015 - Present	<b>Graduate Research Assistant</b> , University of Tennessee Knoxville, Knoxville, TN. Dept: Biochemistry & Cellular and Molecular Biology. PI: Dr. Barry D. Bruce.
10/2013	<b>Partner and Part Owner</b> of Quicksilver Scientific, Inc. Lafayette, CO. International clinical laboratory, CLIA, FDA and NELAC certified.
6/2011- 6/2015	<b>Chief Analyst and Research Scientist</b> at Quicksilver Scientific, Inc., Lafayette, CO. Duties: Analysis of environmental and human samples for various forms of mercury and other toxic and nutrient metals. Engaged in the development and manufacture of liposomal supplement products to aid in human detoxification of heavy metals.
3/2010 - 6/2011	<b>Research Chemist</b> at Quicksilver Scientific, Inc. under Dr. Christopher Shade. Designed and conducted experiments, which included the synthesis of various metallic nanoparticles and observation of specific catalytic properties in aqueous systems.
8/2009 - 11/2009	<b>Sample Preparation Chemist</b> at Life Science Laboratories, Syracuse, NY. Employed in the Inorganic Technical Center. Primary duty entailed the preparation and digestion of sediment, water, food and municipal waste to be analyzed by ICP-OES and ICP-MS for heavy metals contamination.

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#### Oral Presentations

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10/2020	<u>International Online Conference on Biohybrid Approaches to Solar Energy Conversion.</u> PSI-SMALP: Can enhanced <i>in vitro</i> photochemistry improve biohybrid solar devices?
3/2020	<u>5<sup>th</sup> International SMALP Conference, New York, NY, USA.</u> Insights into the Formation and Future Applications of PSI-SMALP.
1/2020	<u>29<sup>th</sup> Western Photosynthesis Conference, Bodega Bay, CA, USA.</u> Insights into Formation, Biophysical Characteristics, and Applications of PSI-SMALP.
11/2019	<u>Life Science Tennessee Convention (LSTcon 2019), Knoxville, TN, USA.</u> LEAPh (Light Energy Applied Photosynthetic) Systems: Harnessing the Power of Nature to Fuel our Industrial World.
11/2019	<u>Oak Ridge National Laboratory Neutrons in Biology Symposium, Knoxville, TN, USA.</u> Insights into Native Membrane Protein Isolation using Neutrons and SMALPs.
11/2019	<u>The Inaugural Knoxville Scipreneur Challenge Pitch Competition, Knoxville, TN, USA.</u> LEAPh (Light Energy Applied Photosynthetic) Systems: Harnessing the Power of Nature to Fuel our Industrial World.
9/2019	<u>The "IP Parade", Scipreneur Challenge, Knoxville, TN, USA.</u> Integration of Photosystem I Nanodiscs into Biohybrid Solar Devices for the Sustainable Production of Electricity.
4/2019	<u>4<sup>th</sup> International SMALP Conference, Utrecht, Netherlands.</u>

- 4/2019 Photosystem I Native Nanodiscs: Preserving the Powerplant of the Planet within Styrene Maleic Acid Lipid Particles (SMALPs).  
Community of Scholars for Biomembranes, Knoxville, TN, USA.
- 1/2019 Photosystem I Native Nanodiscs: Preserving the Powerplant of the Planet using Styrene Maleic Acid Lipid Particles (SMALPs).  
28<sup>th</sup> Western Photosynthesis Conference, Friday Harbor, WA, USA.
- 7/2018 Investigating Dimensions, Constituents and Activity of PSI Complexes within Styrene Maleic Acid Lipid Particles (SMALPs).  
International Society for Photosynthesis Research, American Society of Plant Biologists 2018 Sessions, Montreal, QC, Canada.
- Investigating the Effect of Native Membrane Retention on *in vitro* Activity of PSI Enveloped within Styrene Maleic Acid Lipid Particle.

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#### Poster Presentations

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- 2/2020 Tennessee Plant Research Center Women in Science Series, Knoxville, TN, USA  
**Nathan G. Brady**, Meng Li, Barry D. Bruce  
Investigating Dimensions, Constituents, and Activity of PSI Complexes Within Styrene Maleic Acid Lipid Particles (Updated).
- 6/2019 ORNL Neutron Scattering User Meeting, Oak Ridge, TN, USA.  
O. Korotych, M. Phan, **N. Brady**, S. Satija, J. Ankner, B. D. Bruce  
Neutron and X-ray Reflectivity Studies of Styrene-Maleic Acid Polymer Interactions with Thylakoid Lipid Monolayers.
- 1/2019 28<sup>th</sup> Western Photosynthesis Conference, Friday Harbor, WA, USA.  
**Nathan G. Brady**, Olena Korotych, Meng Li, Barry D. Bruce  
Investigating Dimensions, Constituents and Activity of PSI Complexes Within Styrene Maleic Acid Lipid Particles.
- 1/2018 27<sup>th</sup> Western Photosynthesis Conference, Oracle, AZ, USA.  
**Nathan Brady**, Jonathan Nguyen, Alex Teodor, Yue Ma, Meng Li, Barry Bruce  
Characterization of Trimeric PSI Within Styrene Maleic Acid Lipid Particle (Updated).
- 11/2017 8<sup>th</sup> International Conference "Photosynthesis and Hydrogen Energy Research for Sustainability – 2017," Hyderabad, India.  
**Nathan Brady**, Jonathan Nguyen, Alex Teodor, Yue Ma, Meng Li, Barry Bruce  
Characterization of Trimeric PSI Encapsulated Within Styrene Maleic Acid Lipid Particle
- 7/2017 Annual Meeting of the American Society of Plant Biologists, Honolulu, HI.  
A. Teodor, **N. Brady**, J. Ossyra, K. Nguyen, X. Cheng, J. Smith, B. Bruce  
Comparative Dynamics of Cyanobacterial Cytochrome C6 Electron Transfer to Photosystem I by *in silico* Biomolecular Brownian Dynamics Simulations and *in vitro* Laser Flash Photolysis
- 1/2017 26<sup>th</sup> Western Photosynthesis Conference, Marshall, CA, USA.  
**Nathan Brady**, John Ossyra, Xiaolin Cheng, Barry D. Bruce, Jeremy Smith  
Biomolecular Brownian Dynamics Simulation of the Docking of Cytochrome c<sub>6</sub> to the Lumenal Surface of PSI (Updated).

- 8/2016 17<sup>th</sup> International Congress on Photosynthesis Research, and Biohybrid Solar Cells Satellite meeting, Maastricht, Netherlands.  
**Nathan Brady**, John Ossyra, Xiaolin Cheng, Barry D. Bruce, Jeremy Smith  
Biomolecular Brownian Dynamics Simulation of the Docking of Cytochrome  $c_6$  to the Lumenal Surface of PSI.
- 1/2016 25<sup>th</sup> Western Photosynthesis Conference, Tabernash, CO, USA.  
**Brady, NG**, Holbrook, KN, Barrera FN, Bruce BD  
In Vitro Analysis of Direct Interaction Between Chloroplast Peptides and Envelope Lipids Using Langmuir-Blodgett Troughs.

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#### Academic Research Experience

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- 8/2016 - Present **Graduate Research Assistant**, Department of Biochemistry & Cellular and Molecular Biology, University of Tennessee at Knoxville. Principle Investigator: Dr. Barry Bruce  
Topics: Fabrication of biohybrid devices, structural characterization of PSI reaction center, detergent free isolation methods of membrane protein complexes.
- 3/2016 - 4/2016 **Rotation Student**, Department of Biochemistry & Cellular and Molecular Biology, University of Tennessee at Knoxville. Principle Investigator: Dr. Jeremy Smith  
Topic: Modeling the docking of cytochrome  $c_6$  to the lumenal surface of photosystem 1 using Brownian Dynamics Simulation.
- 1/2016 - 3/2016 **Rotation Student**, Department of Biochemistry & Cellular and Molecular Biology, University of Tennessee at Knoxville. Principle Investigator: Dr. Barry Bruce  
Topic: Measuring quantum efficiency of dye sensitized solar cells with various pigments and extraction methods.
- 10/2015 - 12/2015 **Rotation Student**, Dept: Biochemistry & Cellular and Molecular Biology, University of Tennessee, Knoxville, TN. Principle Investigator: Dr. Francisco Barrera  
Topic: Interaction between RUBISCO small subunit transit peptide with *in vitro* chloroplast outer membrane mimetic.
- 5/2011 - 10/2012 **Industrial Researcher**, Dept: Aquatic Fisheries Biology, Colorado State University, Fort Collins, CO. Principle Investigator: Dr. Jesse Lepak  
Topic: Developed sampling protocol, analyzed mercury in sediment, water column and benthic invertebrates of freshwater reservoirs.
- 9/2008 - 5/2009 **Undergraduate Researcher**, Chemistry Department, SUNY-ESF, Syracuse, NY.  
Principle Investigator: Dr. David Johnson  
Topic: Designed and implemented experiments to research nitrogen requirement for anaerobic digestion systems.
- 1/2008 - 5/2008 **Undergraduate Researcher**, Chemistry Department, SUNY-ESF, Syracuse, NY.  
Principle Investigator: Dr. Mark Teece  
Topic: Analyzed fatty acids of marine macroalgae in coral reef systems by GC.

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#### Academic Leadership

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- 11/2019 Graduate Student Representative, Round Table Discussion with Chancellor Plowman
- 6/2019 - 6/2020 President, BCMB Graduate Student Organization
- 3/2019 - 6/2019 Graduate Student Representative, BCMB Departmental Recruitment Committee
- 6/2017 - 6/2019 Treasurer, BCMB Graduate Student Organization

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#### Professional Societies

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- 7/2020 - Present Knoxville Chapter Head, BioTN Academic Alliance  
9/2016 - Present Member, American Association for the Advancement of Science  
3/2016 - Present Member, The International Society of Photosynthesis Research  
1/2016 - Present Member, The Tennessee Plant Research Center
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#### Teaching Experience

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- 8/2020 – Present **Graduate Teaching Assistant** for BIO 101, University of Tennessee Knoxville.  
Introduction to Biology Laboratory for non-science majors.
- 1/2016 - 12/2019 **Graduate Teaching Assistant** for BCMB 419, University of Tennessee Knoxville.  
Cellular and Comparative Biochemistry Laboratory, 5 semesters.
- 8/2016 - 12/2016 **Graduate Teaching Assistant** for BIO 101, University of Tennessee Knoxville.  
Introduction to Biology Laboratory for non-science majors, 1 semester.
- 7/2013 - 6/2015 **Laboratory Management**, Quicksilver Scientific, Inc. Lafayette, CO.  
Trained employees in direct support to healthcare practitioners for report interpretation, manufacture of liposomal delivery systems for detoxification products and analytical positions using HPLC, ICP-MS and UV-Vis spectroscopy techniques.
- 2006 - 2008 **General Chemistry Tutor**, SUNY-ESF, Syracuse, NY.

References available upon request.

Last Updated: 4/1/2021