**Erwin G. Abucayon, Ph.D.**

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## Highlights of Qualifications

- Prolific researcher with over 10 peer-reviewed papers in internationally prestigious journals, including *Journal of the American Chemical Society* and *Angewandte Chemie*; and over 20 oral/poster presentations
- Multidisciplinary background (bioinorganic, polymer, and analytical chemistry; organic synthesis)
- Proficient in mass spectrometry, electrochemistry, chromatography, spectroscopy, and X-ray crystallography
- Ability to manage multiple priorities
- Highly organized, detail-oriented, results-driven, and resilient
- Strong work ethics and ability to work on multicultural settings
- Experienced in planning/managing lab projects
- Reviewer of scientific articles
- Passionate educator with over 5 years of teaching/research mentor experience
- Outstanding graduate student with GPA of 4.0/4.0, and several awards/honors

## Education

- Ph.D. in Chemistry, University of Oklahoma, 2017
  - Field of Study – Inorganic Chemistry, Organometallic Chemistry, and Spectroelectrochemistry
  - Title of Dissertation – Chemical Modeling of Unstable Intermediates in Heme-mediated NOx Biology
  - Supervisor – Dr. George B. Richter-Addo
- M.S. in Chemistry, De La Salle University, 2012
  - Field of Study – Analytical Chemistry, and Polymer Chemistry
  - Title of Thesis – Bisphenol-A Imprinted Polymers for the Binding and Molecular Recognition of Bisphenol Derivatives
- B.S. in Chemistry, Western Mindanao State University (*magna cum laude*), 2008
  - Field of Study – Analytical Chemistry
  - Title of Thesis – Utilization of Wood Sawdust for the Adsorption of Lead Ion ($Pb^{2+}$) in Aqueous Solution

## Work Experience

**University of Oklahoma**
*Department of Chemistry and Biochemistry*

***Postdoctoral Research Fellow*** *(May 2017 – Present)*

- Analytical techniques and instrumentation expertise
  - Mass spectrometry, gas chromatography, HPLC, NMR for characterization of organic and gas products
  - UV-vis, FTIR, EPR and spectro-electrochemistry for characterization of metal complexes/inorganic products
  - Small molecule X-ray crystallography for structural characterization of metal complexes
  - Schlenk line and glove box for synthesizing air and moisture sensitive compounds
- Inorganic and organic synthesis experience
  - Synthesize and characterize H/RNO complexes of iron porphyrins that model fungal nitric oxide reductase
  - Synthesize and characterize adducts of Lewis acid and nitrosyl iron phorphyrin complexes that model bacterial nitric oxide reductase
  - Synthesize different derivatives of free base porphyrins and labeled RNO organic compounds
- Laboratory managing experience
  - Mentor and train undergraduate and new graduate students (6) with both synthetic methodologies and analytical/spectroscopic techniques
  - Focal person in lab safety (2017-2019)
  - Maintenance of lab instrumentation (e.g., electrochemistry, spectroscopy, etc)
  - Write reports and articles in peer-reviewed journals

Other Responsibilities

- Help the PI in data organization and project discussion for grant writing
- Attend national and international conferences

Other Training

- Experimenter/participant at the *American Crystallographic Association Summer Class on Small Molecule X-ray Crystallography* (Northwestern University). This comprehensive workshop covered crystal sample mounting, data collection, and solution/refinement of crystal structures. (2017)

***Graduate Associate*** *(August 2013 – May 2017)*

- Analytical techniques and instrumentation expertise
  - Mass spectrometry, gas chromatography, HPLC, NMR for characterization of organic and gas products

  - UV-vis, FTIR, EPR and spectro-electrochemistry for characterization of metal complexes/inorganic products
  - Schlenk line and glove box for synthesizing air and moisture sensitive compounds
- Inorganic and organic synthesis experience
  - Synthesize and characterize H/RNO complexes of iron porphyrins
  - Synthesize different derivatives of free base porphyrins, labeled and unlabeled RNO organic compounds, and NO donor diazeniumdiolate organic species

Other Responsibilities
- Help the PI in data organization and project discussion for grant writing
- Attend national and international conferences
- Teaching assistant to undergraduate chemistry courses such as general chemistry, organic, advanced organic and advanced inorganic chemistry lab.
- Mentor and train undergraduate and new graduate students with synthetic methodologies and analytical/spectroscopic techniques

Other Trainings
- Experimenter/participant at the *Principles of EPR Workshop* (Milwaukee, WI). This workshop covered the advanced theory and principles of electron paramagnetic resonance (EPR) spectroscopy and its utilization in research both for metal and non-metal compounds. Interpretation of sample spectra was also covered. Some advanced EPR techniques such as pulse EPR were also presented and discussed. [Instructors were Drs. Candice Klug and Brian Bennett] (2015)
- Experimenter/participant at the *Penn State University Bioinorganic Training Workshop and Frontiers in Metallobiochemistry*. This workshop covered a broad range of spectroscopic techniques such as electron paramagnetic resonance (EPR), nuclear magnetic resonance (NMR), magnetic circular dichroism (MCD), stop-flow techniques, Mossbauer, and vibrational spectroscopy. Density functional theory (DFT), X-ray crystallography, and synchrotron-based spectroscopic techniques were also presented and discussed. Hands-on participation with our research samples was a requirement for this workshop. [Instructors were Drs. Carsten Krebs (Mossbauer), Stefan Stoll and Art van der Est (EPR), Nicolai Lehnert (MCD), Frank Neese (DFT and vibrational spectroscopy)] (2014)

**Department of Science and Technology, PHILIPPINES**
*Industrial Technology Development Institute*

***Science Research Specialist*** *(October 2008 – July 2012)*
- Method development and method validation experience
  - Develop methods for the detection of packaging related contaminants in foods and beverages such as carcinogenic bisphenol A and bisphenol diglycidyl derivatives by GC-FID and GC-MS
  - Develop methods for the detection of aldehydes and other contaminants from plastic in bottled water by Headspace GC-MS
- Analytical techniques and instrumentation expertise
  - Mass spectrometry, gas chromatography mass spectrometry, HPLC, UV-vis, FTIR for detecting plastic related contaminants in foods and beverages
  - DSC for characterizing thermal profiles of plastics

Other Responsibilities
- Plan/manage directions of the project with the supervisor
- Conduct awareness seminars in different regions in the Philippines about toxic contaminants
- Provide consultation services to small enterprises with regards to the compatibility and safety of certain plastics for food packaging
- Conduct QC for different packaging materials used to package foods
- Write reports to clients, and terminal summary of experimental results and findings for funding agencies.
- Attend national conferences

Other Trainings
- Experimenter/participant at the training workshop on *Specific Migration of Substance from Printing Inks and Recycled Materials into Food* (PIRA, Surrey, United Kingdom). This training course covered migration of contaminants related to printing inks and recycled materials into foods. Specifically, this included utilization of spectroscopic and chromatographic techniques to determine and quantify the above-mentioned contaminants in foods. (2010)
- Experimenter/participant at the training workshop on *Food Contact Analysis and Migration Testing* (PIRA, Surrey, United Kingdom). This training course covered food contact analysis and migration testing. Specifically, this included training on spectroscopic and chromatographic techniques that can be utilized to determine and quantify the amount of packaging related contaminants in food products. (2019)

***New Mexico State University***

- Utilization of electrochemical techniques in determining nanoparticle size

***De La Salle University, Philippines***

- Synthesis and characterization (morphology and size determination) of imprinted polymers by SEM

## Scholarships and Recognitions

- Provost's Ph.D. Dissertation Prize, University of Oklahoma
- Sherril D. Christian Award, University of Oklahoma
- Graduate Student International Travel Fellowship, University of Oklahoma
- Belle W. Goodman Award, University of Oklahoma
- Peer Recognition Award, University of Oklahoma
- Nancy L Mergler Dissertation Award, University of Oklahoma
- Roger E. Frech Award, University of Oklahoma
- Department of Science and Technology Scholar, WMSU

## Publications

(*As Postdoc*)

1. **Abucayon, E. G**.; Khade, R.; Zhang, Y.; Richter-Addo, G. B. "Not limited to Iron: A Cobalt Heme–NO Model Facilitates N–N Coupling with External NO in the Presence of a Lewis Acid to Generate $N_2O$". *Angew. Chem. Int. Ed.* **2019**, *58*, 2-8.
2. **Abucayon, E. G**.; Khade, R. L.; Powell, D. R.; Zhang, Y; Richter-Addo, G. B."Lewis Acid Activation of the Ferrous Heme-NO Fragment Toward the N−N Coupling Reaction with NO to Generate $N_2O$." *J. Am. Chem. Soc*. **2018**, *140*, 4204-4207.
3. Zink, J.; **Abucayon, E. G**.; Ramuglia, A.; Fadamin, A.; Eilers, J.; Richter-Addo, G. B.; Shaw, M. J."Electrochemical Investigation of the Kinetics of Chloride Substitution Upon Reduction of [Ru(por)(NO)Cl] Complexes in Tetrahydrofuran." *ChemElectroChem* **2018**, *5*, 861-871.
4. **Abucayon, E. G**.; Powell, D. R.; Richter-Addo, G. B. "Carbon-Nitrogen and Nitrogen-Nitrogen Bond Formation from Nucleophilic Attack at Coordinated Nitrosyls in Fe and Ru Heme Models." *J. Am. Chem. Soc.* 2017, *139*, 9495−9498.
5. **Abucayon, E.G**.; Chu, J-M.; Ayala, M.; Khade, R; Powell, D, Zhang, Y. and Richter-Addo. Insight Into the Preferential *N*-Binding versus *O*-Binding of Nitrosoarenes to Ferrous and Ferric Heme Centers. (Manuscript is currently under review in *Dalton. Trans.)*

(*As Graduate Student*)

6. **Abucayon, E. G**.; Khade, R. L.; Powell, D. R.; Zhang, Y.; Richter-Addo, G. B. "Over or Under: Hydride Attack at the Metal versus the Coordinated Nitrosyl Ligand in Ferric Nitrosyl Porphyrins." *Dalton Trans*. **2016**, *45*, 18259−18266.
7. **Abucayon, E. G**.; Khade, R. L.; Powell, D. R.; Zhang, Y.; Richter-Addo, G. B. "Hydride Attack on a Coordinated Ferric Nitrosyl: Experimental and DFT Evidence for the Formation of a Heme Model-HNO Derivative." J. Am. Chem. Soc. **2016**, *138*, 104−107.
8. Xu, N.; **Abucayon E. G**.; Powell D. R.; Richter-Addo G. B."A Bridged Di-Iron Porphyrin Hyponitrite Complex as a Model for Biological $N_2O$ Production from Hyponitrite." Nitric Oxide Biol. Chem. **2016**, *52*, 16−20.
9. Xu, N.; Christian, J. H.; Dalal, N. S.; **Abucayon, E. G**.; Lingafelt, C.; Powell, D. R.; Richter-Addo, G. B." Unusual Six-coordinate Ferric Porphyrins Containing Bidentate *N*-*t*-Butyl-*N*-nitrosohydroxylaminato Ligands: Structure, Magnetism, IR Spectroelectrochemistry, and Reactivity." *Dalton Trans*. **2015**, *24*, 20121−20130.
10. **Abucayon, E. G**.; Awasabisah, D.; Powell D. R.; Richter-Addo G. B."(1-Methylimidazole)-(o-nitrosotoluene)(5,10,15,20-tetraphenylporphyrinato)iron(II) dichloromethane solvate." Acta Cryst. E. **2014**, 70, m51−m52.
11. **Abucayon, E. G**.; Ke, N.; Cornut, R.; Patelunas, A.; Miller, D.; Nishiguchi, M. K.; Zoski, C. G. "Investigating Catalase Activity Through Hydrogen Peroxide Decomposition by Bacteria Biofilms in Real Time Using Scanning Electrochemical Microscopy." *Anal. Chem*. **2014**, *86*, 498–505.

*(Manuscripts to be submitted shortly; all experimental/DFT work completed)*

12. **Abucayon, E. G**.; Khade, R.; Zhang, Y.; Powell, D. R.; Richter-Addo, G. B. "Electronic Consequences of *trans*-Ligands in Ferric-NO Hemes: Structural and DFT studies", to be submitted in December 2020.
13. Ye, G.; **Abucayon, E. G**.; Khade, R.; Zhang, Y. Powell, D. R.; Richter-Addo, G. B. "Unprecedended NO Insertion into Metal-Carbon Bonds in Metalloporphyrins", to be submitted in January 2021.

## Presentations and Conferences Attended

- *National*. 257th ACS National Meeting, Orlando, FL. *Poster*: Nitroxyl Complexes of Ruthenium Porphyrins. Zink, J.; Abucayon, E. G. and Richter-Addo, G. B. (2019)
- *Local*: 64th Annual ACS Pentasectional Meeting, Norman, Oklahoma. *Oral*: Lewis Acid Activation of the Heme Ferrous−NO Toward the N−N Coupling Reaction with NO: Chemical Modeling of *bacNOR* Active Site. Abucayon, E. G. and Richter-Addo, G. B. (2019)

- *International*. Packaging Technology Division, Industrial Technology Development Institute, Department of Science and Technology, Philippines. *Invited talk*: Modeling of Unstable Intermediates in Heme- mediated $NO_x$-chemistry. Abucayon, E. G.; Khade, R.; Zhang, Y.; Richter-Addo, G. B. (2018)
- *International*: 10th International Conference on Porphyrins and Phthalocyanines (ICPP), Munich, Germany. *Oral presentation*: Probing the Chemical Reactivity of the Bound NO in Heme-NO Models. Abucayon, E. G.; Richter-Addo, G. B. (2018)
- *International*: 10th International Conference on Porphyrins and Phthalocyanines (ICPP), Munich, Germany. *Poster presentation*: Reactivities of Bound NO in Ferric Heme Models. Abucayon, E. G.; Khade, R.; Zhang, Y.; Richter-Addo, G. (2018)
- *Local*: OU Annual Undergraduate Research Day, University of Oklahoma, Norman. *Oral presentation*: Carbon-Nitrogen Bond Cleavage in Nitrosoalkanes Mediated by Heme Models." Giza, S.; Abucayon, E. G.; Richter-Addo, G. B. (2018)
- *National*: National Conference on Undergraduate Research, University of Central Oklahoma. *Oral presentation*: Carbon-Nitrogen Bond Cleavage in Nitrosoalkanes Mediated by Heme Models." Giza, S.; Abucayon, E. G.; Richter-Addo, G. B. (2018)
- *National*: 254th National American Chemical Society Meeting, Washington, D.C. *Oral presentation*: Fe−HNO vs (NO)Fe−H Formation from Hydride Attack at Ferric Nitrosyl Porphyrins. Abucayon, E. G.; Khade, R.; Powell, D. R.; Zhang, Y.; Richter-Addo, G. B. (2017)
- *Local*: OU Annual Freshmen FYRE Symposium Poster Session. *Poster presentation*: Carbon-Nitrogen Bond Cleavage in Nitrosoalkanes Mediated by Heme Models. Giza, S. I.; Kim, A. K.; Abucayon, E. G.; Richter-Addo, G. B. (2017)
- *Local*: OU Annual Freshmen FYRE Symposium Poster Session. *Poster presentation*: Carbon-Nitrogen Bond Cleavage in Nitrosoalkanes Mediated by Heme Models." Kim, A. K.; Giza, S., I.; Abucayon, E. G.; Richter-Addo, G. B. (2017)
- *International*: Gordon Research Conference-Bioinorganic Chemistry; Graduate Research Seminar, Ventura, CA. *Poster presentation*: Hydride Attack at the Ferric Nitrosyl Porphyrins to Generate Nitroxyl (por)Fe-HNO Derivatives. Abucayon, E. G.; Khade, R.; Powell, D. R.; Shaw, M. J.; Zhang, Y.; Richter-Addo, G. B. (2017)
- *International*: 9th International Conference on Porphyrins and Phthalocyanines, Nanjing, China. *Poster presentation*: Nitroxyl (HNO) Derivatives via Hydride Attack at the Coordinated Nitrosyls in Ferric Porphyrins. Abucayon, E. G.; Khade, R.; Zhang, Y.; Richter-Addo, G. B. (2016)
- *International*: 9th International Conference on Porphyrins and Phthalocyanines, Nanjing, China. *Invited oral presentation:* Hydride Attack at the Coordinated Nitrosyl in a Ferric Porphyrin Generates the Fe−HNO Derivative. Abucayon, E. G.; Khade, R.; Zhang, Y.; Richter-Addo, G. B. (2016)
- *Local*: NSF-sponsored Research Experience for Undergraduates (REU) Summer Research Poster Session, held at the SLSRC, OU-Norman campus. *Poster presentation*: Molecular Structures and Redox Behavior of Iron and Ruthenium Non-heme Model Complexes. Ross, B.; Abucayon, E. G.; Powell, D. R.; Richter-Addo, G. B. (2016)
- *National*: 251st National Meeting of the American Chemical Society, San Diego, CA. *Oral presentation*: Nitroxyl (HNO) Complexes of Iron Porphyrins. Abucayon, E. G.; Khade, R.; Zhang, Y.; Richter-Addo, G. B.(2016)
- *Local*: CHEM 5360 OU-Bioinorganic Chemistry Graduate class. I gave an invited lecture to this graduate class, on the theory and applications of electron paramagnetic resonance. (2015)
- *National*: Principles of EPR Workshop, Milwaukee, WI. *Poster presentation*: Unusual Six-coordinate Ferric Porphyrins Containing Bidentate *N*-*t*-Butyl-*N*-nitrosohydroxylaminato Ligands: Structure, Magnetism, and Reactivity. Abucayon, E. G.; Xu, N.; Christian, J. H.; Dalal, N. S.; Lingafelt, C.; Powell, D. R.; Richter-Addo G. B. (2015)
- *Local*: NSF-sponsored Research Experience for Undergraduates (REU) Summer Research Poster Session, held at the SLSRC, OU-Norman campus. *Poster presentation*: Non-Porphyrin Iron Complexes and the Effects of RNO Binding to Myoglobin. Sallee, D.; Abucayon, E. G.; Richter-Addo, G. B. (2015)
- *Local*: OU Annual Freshmen First Year Research Experience (FYRE) Symposium Poster Session. *Poster presentation*: A New Non-heme Iron Complex: Synthesis, X-ray Crystallography, Electrochemistry, and Reactivity. Brown, C.; Snodell, A.; Abucayon, E. G.; Powell, D. R.; Richter-Addo, G. B. (2015)
- *Local*: OU Annual Freshmen First Year Research Experience (FYRE) Symposium Poster Session. *Poster presentation*: Synthesis, X-ray Crystallography, Electrochemistry, and Reactivity of a New Iron Complex. Snodell, A.; Brown, C.; Abucayon, E. G.; Powell, D. R.; Richter-Addo, G. B. (2015)
- *Regional*: 70th Southwest Meeting of the American Chemical Society, Fort Worth, TX. *Oral presentation*: Six-coordinate Ferric Porphyrins Containing Bidentate *N*-*t*-Butyl-*N*-nitrosohydroxylaminato Ligands: Structure, IR Spectroelectrochemistry, and Reactivity. Abucayon, E. G.; Xu, N.; Lingafelt, C.; Powell, D. R.; Richter-Addo, G. B. (2014)
- *International*: Penn State University Bioinorganic Training Workshop and Frontiers in Metallobiochemistry III, PA**.** *Poster presentation*: Model Complexes of Biological Heme-NOx Reactions. Abucayon, E. G.; Awasabisah, D.; Powell, D. R.; Richter-Addo, G. B. (2014)

**Teaching and Mentoring Experience**

- Instructor of Record, CHEM 1154 (General, Organic and Biological Chemistry); Division of Science, Oklahoma State University, Oklahoma City Campus (2019)

- Teaching Assistant for CHEM 4444: Advanced Organic Synthesis (for Senior Chemistry and Biochemistry majors) (Fa 2015)
- Teaching Assistant for CHEM 3152: Organic Chemistry (Sp 2015)
- Teaching Assistant for CHEM 4444: Advanced Organic Synthesis (for Senior Chemistry and Biochemistry majors) (Fa 2014)
- Teaching Assistant for CHEM 1315: General Chemisty (Sp 2014)
- Research Mentor: Mentored one (1) first year graduate student during his lab rotation. I taught her advanced synthetic methodologies and spectroscopic techniques that we routinely use for compound characterization. (Fa 2019)
- Research Mentor: Mentored one (1) first year graduate student during his lab rotation. I taught her advanced synthetic methodologies and spectroscopic techniques that we routinely use for compound characterization. (Fa 2018)
- Research Mentor: Mentored one (1) first year graduate student during his lab rotation. I taught him advanced synthetic methodologies and spectroscopic techniques that we routinely use for compound characterization. I also mentored one (1) undergraduate student. I taught her advanced synthetic methodologies, spectroscopic techniques, and reactivity studies. (Fa 2017)
- Research Mentor: Mentored two (2) First Year Research Experience (FYRE) students from the OU Department of Chemical Engineering, and Petroleum Engineering. One of them won the best poster award for his presentation. (Sp 2017)
- Research Mentor: Mentored two (2) first year graduate students during their lab rotations. I taught them advanced synthetic methodologies and spectroscopic techniques that we routinely use for compound characterization. (Fa 2016)
- Research Mentor: Taught and guided two (2) first year graduate students on the use of advanced synthetic methodologies and spectroscopic techniques for compound characterization. (Sp 2016)
- Research Mentor: Mentored one (1) REU student from California State University. Taught and guided the undergraduate student with several synthetic methodologies and spectroscopic techniques (e.g. IR, UV-Vis, NMR) as part of his summer (8 weeks) NSF-sponsored Research Experience for Undergraduate. (Summer 2015)
- Research Mentor: Mentored two (2) FYRE students from the OU Department of Chemical Engineering, and Department of Psychology. I taught several synthetic methodologies and characterization techniques. One of them won the best poster award for his presentation. (Sp 2015)
- Research Mentor: Mentored two (2) first year graduate students during their lab rotations. I taught them advanced synthetic methodologies and spectroscopic techniques that we routinely use for compound characterization. (Fa 2015)

## Service

- Reviewer of articles for *Inorganica Chimica Acta*, and *Journal of Coordination Chemistry*
- Judge of the poster competition at the National Organization of Black Chemists and Chemical Engineers (NOBCChe) Conference 2020
- Abstract reviewer of the National Organization of Black Chemists and Chemical Engineers (NOBCChe) Conference 2020
- Judge for the undergraduate and graduate research poster competition during the 64$^{th}$ ACS Oklahoma Pentasectional Meeting, 2019
- Judge for the first year research experience (FYRE) program poster competition at the University of Oklahoma, Spring 2018
- Judge for the first year research experience (FYRE) program poster competition at the University of Oklahoma, Spring 2017

## Affiliations/Memberships

- American Chemical Society
- Philippine-American Academy of Science and Engineering
- Society of Porphyrins and Phthalocyanines
- Integrated Chemists in the Philippines