Brian C. Sanders, PhD

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RESEARCH EXPERIENCE & EDUCATION

Oak Ridge National Laboratory, Associate Staff R&D (05/2019 – Present)
Energy and Environmental Sciences Directorate
Biosciences Division

California Institute of Technology, NIH Postdoctoral Fellow (04/2017 – 04/2019)
Principal Investigator: **Brian C. Sanders**; Mentor: **Prof. Harry B. Gray**

California Institute of Technology, Postdoctoral Scholar (08/2015 – 03/2017)
Principal Investigator: **Prof. Harry B. Gray**

Project: Discovering and Engineering Electron Tunneling Pathways in Cytochrome P450

University of Georgia, PhD, Bioinorganic Chemistry (05/2010 – 05/2015)
Principal Investigator: **Prof. Todd C. Harrop**

Project: Synthesis and Properties of Non-heme Iron-NO_x Therapeutics and Catalysts

Principal Investigator: **Prof. Geert Jan Boons** (08/2008 – 05/2010)

Project: Development of 'Click' Chemistry Methods for Bioconjugation

University of Tennessee, BS in Chemistry (08/2003 – 05/2008)
Principal Investigator: **Prof. David C. Baker**
Oak Ridge National Laboratory
Principal Investigators: **Dr. Robert F. Standaert, Dr. Scott T. Retterer**

Project: Synthesis of Thiol-Terminated Mannose for Functionalization of Gold Surfaces

AWARDS & FELLOWSHIPS

- Ruth L. Kirschstein NRSA Postdoctoral Fellowship 1 F32 GM123639-01 (2017)
- Martin Reynolds Smith Award Endowed by the family of Martin R. Smith (2015)
  The University of Georgia Department of Chemistry
  Recognizes the best research paper in a refereed journal for 2014
- Mary Laraine Young Hines Graduate Fellowship in Cancer Research (2014)
  University of Georgia Franklin College of Arts and Sciences
- 2nd Place (of 51) in Annual Research Retreat Poster Competition (2013)
  University of Georgia Department of Chemistry
- Kenneth W. Whitten Award for Outstanding Teaching Assistant (2009)
  University of Georgia Department of Chemistry

OUTREACH AND MENTORING

2020	Remote mentorship involving researching and preparing reports on COVID-19 enzymes and inhibitors to supplement active research at ORNL. This was supported by the HERE-CUGS Mentorship for Environmental Scholars (MES) Program for 10-weeks. The program encourages applications from underrepresented students in STEM.
2019	Mentored one undergraduate student from Northeastern University. The project involved the synthesis and characterization of plant metabolites at ORNL. The student is still completing their undergraduate education at Northeastern, but has expressed sincere interest in continuing research in chemistry.
2018	Mentored one undergraduate from Mercer University (GA) in applying to and being awarded a Caltech Summer Undergraduate Research Fellowship (SURF). I am responsible for mentoring and training the student to complete an independent research project over a 10 week program that began June 19, 2018. Current project involves hole hopping in cytochrome P450. Student was awarded "Outstanding Poster" at the SoCal Undergraduate Research Symposium, University of California, Irvine.
2017	Judge at the INTEL International Science and Engineering Fair (INTEL ISEF), Los Angeles, CA.
2015	Volunteer for the National Science Foundation Center for Chemical Innovation (NSF-CCI) Solar Army Outreach Volunteer. This outreach work involves training and supplying materials for middle and high school teachers for hands-on experiments to supplement their science courses with solar fuel related material.
2015	Volunteer at San Diego Festival of Science and Engineering: Helped demonstrate solar concepts and technologies, specifically assisting children with making dye-sensitized solar cells from blackberry juice, a CCI-Solar Army program called Juice from Juice.
2016	Mentored two undergraduates from University of Puerto Rico and Smith College in applying to and being awarded the Amgen Foundation summer research fellowship at Caltech. I was responsible for mentoring and training the students to complete an independent research project over a 10-week program that began June 13, 2016.
2015 - 2018	Mentored a Caltech undergraduate in applying to and being awarded a Summer Undergraduate Research Fellowship (SURF). I am responsible for mentoring and training the student to complete an independent research project over a 10-week program. I continued to work with this student for the remainder of their undergraduate career. Currently writing a manuscript for electrocatalytic CO_2 reduction. The student is going to graduate school at Northwestern University for chemistry.
2012 - 2014	Responsible for training and mentoring undergraduate students in independent research project related to my Doctoral research at the University of Georgia. Students went on to post-graduate endeavors at Medical College of Georgia, Duke University, and Louisiana State University.

PUBLICATIONS

1. Mette L. H. Sørensen[†], **Brian C. Sanders**[†], Lillian P. Hicks, Maria H. Rasmussen, Andreas L. Vishart, Jacob Kongsted, Jay R. Winkler, Harry B. Gray, and Thorsten Hansen. Hole Hopping through Cytochrome P450, *J. Phys. Chem. B*, **2020**, 124, 15, 3065–3073. [†]Authors contributed equally to this work.

2. Cooper, C. J., Zheng, K., Rush, K. W., Johs, A., **Sanders, B. C.**, Pavlopoulos, G. A., Kyrpides, N. C., Podar, M., Ovchinnikov, S., Ragsdale, S. W., and Parks, J. M. Structure determination of the HgcAB complex using metagenome sequence data: insights into microbial mercury methylation, *Commun. Biol.,* **2020,** *3*, 320.

3. Danh Ngo, Sarah A. Del Ciello, Brendon J. McNicholas, **Brian C. Sanders**, Javier Fajardo, Harry B. Gray, Jay R. Winkler* Cyano-Ambivalence: Spectroscopy and Photophysics of [Ru(diimine)(CN-$BR_3)_4]_2^-$ Complexes, *Polyhedron*, **2020**, *188,* 114692.

4. Sanders, B. C.; Sheridan, T. R.; Kramer, W. W.; Winkler, J. R.; Gray, H. B. *et al.* Highly-Charged Re and Mn Bipyridine Complexes for Homogenous CO_2 Reduction to CO, **2020**. *Manuscript in preparation.*

5. Rhine, M.A.[†]; **Sanders, B. C.**[†]; Patra, A.K.; Harrop, T. C. Overview and New Insights into the Thiol Reactivity of Coordinated NO in $\{MNO\}^{6/7/8}$ (M = Fe, Co) Complexes. *Inorg. Chem.* **2015**, *54*, 9351-9366. [†]Authors contributed equally to this work.

6. **Sanders, B. C.**; Hassan, S.M; Harrop, T. C. Catalytic Reduction of NO_2^- from a Non-heme NiR Model Complex. *J. Am. Chem. Soc.* **2014**, *136*, 10230-10233.
Highlighted in ACS Select Virtual Issue on recent developments in Bioinorganic Chemistry

7. **Sanders, B. C.**; Rhine, M. A.; Harrop, T. C. Properties of $\{FeNO\}^8$ and $\{CoNO\}^9$ Metal Nitrosyls in Relation to Nitroxyl Coordination Chemistry. *Struct. Bond.* **2014**, *160*, 57-88.

8. **Sanders, B. C.**; Patra, A. K.; Harrop, T. C. Synthesis, Properties, and Reactivity of a Series of Non-heme $\{FeNO\}^{7/8}$ Complexes: Implications for Fe-nitroxyl Coordination. *J. Inorg. Biochem.* **2013**, *118*, 115-127.

9. Patra, A. K.; Dube, K. S.; **Sanders, B. C.**; Papaefthymiou, G. C.; Conradie, J.; Ghosh, A.; Harrop, T. C. A Thermally Stable $\{FeNO\}^8$ Complex: Properties and Biological Reactivity of Reduced MNO Systems *Chem. Sci.* **2012**, *3*, 364-369.

10. Agarwal, J.; **Sanders, B. C.**; Fujita, E.; Schaefer III, H. F.; Harrop, T. C.; Muckerman, J. T. Exploring the Intermediates of Photochemical CO_2 Reduction: Reaction of $Re(dmb)(CO)_3$ COOH with CO_2. *Chem. Commun.* **2012**, *48*, 6797-6799.

11. **Sanders, B. C.**; Friscourt, F.; Ledin, P. A.; Mbua, N. E.; Arumugam, S.; Guo, J.; Boltje, T. J.; Popik, V. V.; Boons, G.-J. Metal-Free Sequential [3 + 2]-Dipolar Cycloadditions using Cyclooctynes and 1,3-Dipoles of Different Reactivity. *J. Am. Chem. Soc.* **2011**, *133*, 949-957. Highlighted in **JACS Beta**: JACS Select #18, 2012. The Chemistry-Glycobiology Frontier (B. Imperiali, Guest Editor).

12. Wang, C.; **Sanders, B.**; Baker, D. C. Synthesis of a Glycodendrimer Incorporating Multiple Mannosides on a Glucoside Core. *Can. J. Chem.* **2011**, *89*, 959-963.

PATENTS

1. Metal-Free Sequential [3 + 2]-Dipolar Cycloadditions using Cyclooctynes and 1,3-Dipoles of Different Reactivity, by **B.C. Sanders**; F. Friscourt; P.A. Ledin; E.N. Mbua; S. Arumugam; J. Guo; T.J. Boltje; V.V. Popik; and G.J. Boons. U.S. Provisional Patent Application. Serial No.: 61/386,841 (September 27, 2010).

CONSULTING

- On-set Chemistry Consultant for the television series *Strange Angel*, Paramount Studios, CBS (2018)

TALKS AND FORMAL PRESENTATIONS

2020 Center for Structural Molecular Biology at ORNL, Oak Ridge, TN
Sanders, B.C.; Conformational Changes in Metalloenzymes and the Control of Electron Transfer

2018 Oak Ridge National Laboratory, Oak Ridge, TN
Sanders, B.C.; Photo-Induced Electron Transfer in Cytochrome P450: Understanding Protective Mechanisms Against Oxidative Damage

2017 Caltech, Microbiology Seminar, MicroMornings, Pasadena, CA
Sanders, B.C.; Hole Hopping in P450: Protective Mechanisms Against Oxidative Damage

2017 Northrop Grumman Invited Seminar, Redondo Beach, CA
Sanders, B.C.; Electron Transfer in Proteins: Theory, Biochemistry, and Application

2017 Caltech Chemical Biology Seminar Seminar Series, Pasadena, CA
Sanders, B.C.; Interrogation of Hole Tunneling Pathways in Cytochrome P450 BM3 as Protective Mechanisms Against Oxidative Damage

2017 Southern California Inorganic Photochemistry Conference, Catalina Island, CA
Sanders, B.C.; Winkler, J.R.; Gray, H.B.; Photoinduced Heme Oxidation in Cytochrome P450

2017 Southern California Inorganic Photochemistry Conference, Catalina Island, CA
Sanders, B.C.; Winkler, J.R.; Gray, H.B.; Photoinduced Hole Hopping in Cytochrome P450 BM3

2016 Pennsylvania State College Bioinorganic Workshop, State College, PA
Sanders, B.C.; Winkler, J.R.; Gray, H.B.; Hole Hopping in P450: Potential for Protective Mechanisms

2014 Georgia Area Inorganic Network, Emory University, Atlanta, GA
Sanders, B.C.; Harrop, T.C.; NO_2^- Activation and Reduction to NO by a Non-heme $Fe(NO_2)_2$ Complex

CONFERENCES AND WORKSHOPS

2019 ARPA-E Workshop on Bioinspired Energy Solutions, Boston, MA

2018 NSF Center for Chemical Innovation Capstone Meeting, Ventura, CA

2018	Gordon Research Conference Metals in Biology, Ventura, CA.
2017	Southern California Bioinorganic Conference, UC Irvine, Irvine, CA
2017	Southern California Inorganic Photochemistry Conference, Catalina Island, CA
2017	Southern California Inorganic Photochemistry Conference, Catalina Island, CA
2016	Pennsylvania State University Bioinorganic Workshop, State College, PA
2016	NSF CCI-Solar Annual Meeting, Newport Beach, CA.
2014	Georgia Area Inorganic Network, Emory University, Atlanta, GA
2014	Gordon Research Seminar Bioinorganic Chemistry, Ventura, CA.
2012	American Chemical Society 244th National Meeting, Philadelphia, PA; Inorganic Division

REFERENCES

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