NAME, POSITION, ACADEMIC DEPARTMENT

Eunsuk Kim

Professor
Department of Chemistry, Brown University

EDUCATION:

INSTITUTION AND LOCATION	DEGREE	YEAR(s)	FIELD OF STUDY
Sangmyung University, Seoul, Korea	B.S.	1994	Chemistry
Korea University, Seoul, Korea	M.S.	1996	Inorganic Chemistry
Johns Hopkins University, Baltimore, MD	Ph.D.	2004	Inorganic Chemistry
Harvard University, Boston, MA	Postdoctoral	2004-2005	Biological Chemistry
MIT, Cambridge, MA	Postdoctoral	2005-2008	Biological Chemistry

PhD dissertation topic: Dioxygen Reactivity of Synthetic Analogues for the Active Sites of Heme-Copper Oxidases: Copper-Ligand Influences in Iron(II)/Cu(I)/O_2 Chemistry (Advisor: Prof. Kenneth D. Karlin)

PROFESSIONAL APPOINTMENTS:

2008-2015 Assistant Professor, Brown University, Department of Chemistry, Providence, RI

2015-2022 Associate Professor, Brown University, Department of Chemistry, Providence, RI

2022-present Professor, Brown University, Department of Chemistry, Providence, RI

ACADEMIC HONORS

2018-present Editorial Board – *Inorganica Chimica Acta*

2015 Deans' Award for Excellence in Teaching in the Physical/Life Sciences

2013 NSF CAREER Award

2013 American Chemical Society (ACS) GREET Award

2010 NSF ADVANCE Award (Career Development Award), NSF-Brown University

2009 Richard B. Salomon Research Award, Brown University

2008 Camille and Henry Dreyfus New Faculty Award

2007-2010 Life Sciences Research Foundation (LSRF) Postdoctoral Fellowship (w/ early retirement in 2008)

2002-2003 Martin & Mary Kilpatrick Fellowship, Johns Hopkins University

2002 Society of Porphyrins and Phthalocyanines (SPP) Student Award

2002 Alexander Kossiakoff Award, Johns Hopkins University

PUBLICATIONS:

(Peer-Reviewed Journal Articles):

1. Kim, E.; Lee, K-B.; Jang, H.G. "Dioxygen Binding to the Singly Alkoxo-Bridged Diferrous Complex: Properties of $[Fe^{II}_2(N\text{-Et-HPTB})Cl_2]BPh_4$." *Bull. Korean. Chem. Soc.*, **1996**, *17*, 1127-1131.

2. Liang, H-C.; Kim, E.; Incarvito, C.D.; Rheingold, A.L.; Karlin, K.D. "A Bis-Acetonitrile Two-Coordinate Copper(I) Complex: Synthesis and Characterization of Highly soluble $B(C_6F_5)_4$-Salts of $[Cu(MeCN)_2]^+$ and $[Cu(MeCN)_4]^+$." *Inorg. Chem.*, **2002**, *41*, 2209-2212.

3. Zhang, C.X.; Liang, H.-C.; Kim, E.-i.; Shearer, J.; Helton, M.E.; Kim, E.; Kaderli, S.; Incarvito, C.D.,; Zuberbühler, A.D.; Rheingold, A.L.; Karlin, K.D. "Tuning Copper-Dioxygen Reactivity and Exogenous Substrate Oxidation via Alterations in Ligand Electronics" *J. Am. Chem Soc.*, **2003**, *125*, 634-635.

4. Kim, E.; Helton, M.E.; Wasser, I.M.; Karlin, K.D.; Lu, S.; Huang, H-w.; Moënne-Loccoz, P.; Incarvito, C.D.; Rheingold, A.L.; Honecker, M.; Kaderli, S.; Zuberbühler, A.D. "Superoxo, μ-peroxo and μ-oxo complexes from heme/O_2 and heme-Cu/O_2 reactivity: Copper-ligand influences in cytochrome *c* oxidase models." *Proc. Natl. Acad. Sci. USA*, **2003**, *100*, 3623-3628.

5. Kamaraj, K.; Kim, E.; Galliker, B.; Zakharov, L.N.; Rheingold, A.L.; Zuberbühler, A.D.; Karlin, K.D. "Copper(I) and Copper(II) Complexes Possessing Cross-Linked Imidazole-Phenol Ligands: Structures and Dioxygen Reactivity." *J. Am. Chem Soc.*, **2003**, *125*, 6028-6029.

6. Karlin, K.D.; Kim, E. "Ligand influences in heme-copper O_2-chemistry as synthetic models for cytochrome *c* oxidase." *Chem. Lett.*, **2004**, *33*, 1226-1231.

7. Kim, E.; Chufán, E.E.; Kamaraj, K.; Karlin, K.D. "Synthetic Models for Heme-Copper Oxidases." *Chem. Rev.*, **2004**, *104*, 1077-1133.

8. Kim, E.; Shearer, J.; Lu, S.; Moënne-Loccoz, P.; Helton, M.E.; Kaderli, S.; Zuberbühler, A.D.; Karlin, K.D. "Heme/Cu/O_2 Reactivity: Change in Fe^{III}-(O_2^{2-})-Cu^{II} Unit Peroxo Binding Geometry Effected by Tridentate Copper Chelation." *J. Am. Chem Soc.*, **2004**, *126*, 12716-12717.

9. Kim, E.; Kamaraj, K.; Galliker, B.; Rubie, N.D.; Moënne-Loccoz, P.; Kaderli, S.; Zuberbühler, A.D.; Karlin, K.D. "Dioxygen Reactivity of Copper and Heme-Copper Complexes Possessing an Imidazole-Phenol Cross-Link." *Inorg. Chem.*, **2005**, *44*, 1238-1247.

10. Kim, E.; Helton, M.E.; Lu, S.; Moënne-Loccoz, P.; Incarvito, C.D.; Rheingold, A.L.; Kaderli, S.; Zuberbühler, A.D.; Karlin, K.D. "Tridentate Copper Ligand Influences on Heme-Peroxo-Copper Formation and Properties: Reduced, Superoxo, and μ-Peroxo Fe/Cu Complexes." *Inorg. Chem.*, **2005**, *44*, 7014-7029.

11. Chufán, E.E.; Mondal, B.; Gandhi, T.; Kim, E.; Rubie, N; Moënne-Loccoz, P.; Karlin, K.D. "Reactivity Studies on Fe^{III}-(O_2^{2-})-Cu^{II} Compounds: Influence of the Ligand Architecture and Copper Ligand Denticity" *Inorg. Chem.*, **2007**, *46*, 6382-6394.

12. Kim, E.; Rye, P.T.; Croy, R.G.; Essigmann, J.M. "Programmable Platinum Antitumor Agents for Ovarian and Breast Cancers" *J. Inorg. Biochem.,* **2009**, *103*, 256-261.

Publications from Brown University begins with #13

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13. Tran, N.G.; Kalyvas, C.; Skodje, K.M; Hayashi, T.; Moënne-Loccoz, P.; Callan, P. E.; Shearer, J.; Kirschenbaum, L.J.; Kim, E. "Phenol Nitration Induced by an $\{Fe(NO)_2\}^{10}$ Dinitrosyl Iron Complex" *J. Am. Chem Soc.* **2011**, *133,* 1184-1187.

14. Liu, C.; Kim, E.; Demple, B.; Seeman, N. C. "A DNA-Based Nanomechanical Device Used To Characterize the Distortion of DNA by Apo-SoxR Protein" *Biochemistry*, **2012**, *51*, 937-943.

15. Skodje, K. M.; Williard, P. G.; Kim, E. "Conversion of $\{Fe(NO)_2\}^{10}$ Dinitrosyl Iron to Nitrato Iron(III) Species by Molecular Oxygen" *Dalton Trans.*, **2012**, *41*, 7849-7851.

16. Seo, J.; Kim, E. "O-Atom Exchange between H_2O and CO_2 Mediated by a Bis(dithiolene)tungsten Complex" *Inorg. Chem.* **2012**, *51*, 7951-7953.

17. Tran, C. T.; Kim, E. "Acid-dependent Degradation of a [2Fe-2S] Cluster by Nitric Oxide" *Inorg. Chem.,* **2012**, *51*, 10086-10088.

18. Fitzpatrick, J.; Kalyvas, H.; Shearer, J.; Kim, E. "Dioxygen mediated conversion of $\{Fe(NO)_2\}^9$ dinitrosyl iron complexes to Roussin's red esters" *Chem. Commun.*, **2013**, *49*, 5550-5552.

19. Seo, J.; Williard, P. G.; Kim, E. "Deoxygenation of Mono-oxo Bis(dithiolene) Mo and W Complexes by Protonation" *Inorg. Chem.* **2013**, *52*, 8706-8712.

20. Tran, C. T.; Skodje, K. M.; Kim, E. "Monomeric Dinitrosyl Iron Complexes: Synthesis and Reactivity." in Progress in Inorganic Chemistry, K. D. Karlin ed., Vol. 58. Wiley. 2014, pp *339-379.*

21. Skodje, K. M.; Kwon, M.-Y.; Chung, S. W.; Kim, E. "Coordination-triggered NO release from a dinitrosyl iron complex leads to anti-inflammatory activity" *Chem. Sci.* **2014**, *5*, 2374-2378.

22. Fitzpatrick, J.; Kalyvas, H.; Filipovic, M. R.; Ivanovic-Burmazović, I.; MacDonald, J. C.; Shearer, J.; Kim, E. "Transformation of a Mononitrosyl Iron Complex to a [2Fe-2S] Cluster by a Cysteine Analogue" *J. Am. Chem. Soc.* **2014**, *136*, 7229-7232.

23. Tran, C.T.; Williard, P. G.; Kim, E. "Nitric Oxide Reactivity of [2Fe-2S] Clusters Leading to H_2S Generation" *J. Am. Chem. Soc.* **2014**, *136*, 11874-11877.

24. Fitzpatrick, J.; Kim, E. "New Synthetic Routes to Iron–Sulfur Clusters: Deciphering the Repair Chemistry of [2Fe–2S] Clusters from Mononitrosyl Iron Complexes" *Inorg. Chem.* **2015**, *54*, pp 10559–10567***. Selected for "Editor's Choice" and featured on the journal cover***

25. Fitzpatrick, J.; Kim, E. "Synthetic Modeling Chemistry of Iron–Sulfur Clusters in Nitric Oxide Signaling" *Acc. Chem. Res.*, **2015**, *48*, 2453–2461.

26. Speelman, A. L.; Zhang, B.; Silakov, A.; Skodje, K. M.; Alp, E. E.; Zhao, J.; Hu, M. Y.; Kim, E.; Krebs, C.; Lehnert, N. "Unusual Synthetic Pathway for an $\{Fe(NO)_2\}^9$ Dinitrosyl Iron Complex (DNIC) and Insight into DNIC Electronic Structure via Nuclear Resonance Vibrational Spectroscopy" *Inorg. Chem.*, **2016**, *55*, pp 5485–5501.

27. Cao, R.; Elrod, L. T.; Lehane, R. L.; Kim, E.; Karlin, K. D. "A Peroxynitrite Dicopper Complex: Formation via Cu–NO and Cu–O_2 Intermediates and Reactivity via O–O Cleavage Chemistry" *J. Am. Chem. Soc.* **2016**, *138*,16148–16158.

28. Elrod, L. T. and Kim, E. "Lewis Acid Assisted Nitrate Reduction with Biomimetic Molybdenum Oxotransferase Complex" *Inorg. Chem*. **2018**, *57*, 2594−2602.

29. Arcadia, C.; Tann, H.; Dombroski, A.; Ferguson, K.; Chen, S.-L.; Kim, E.; Rose, C.; Rubenstein, B. M.; Reda, S.; Rosenstein, J. "Parallelized Linear Classification with Volumetric Chemical Perceptrons" *Proceedings of the IEEE International Conference on Rebooting Computing (ICRC)* ***2018***, pp. 1-9. doi:10.1109/ICRC.2018.8638627

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31. Arcadia, C. E.; Kennedy, E.; Geiser. J.; Dombroski, A.; Oakley, K.; Chen, S.-L.; Sprague, L.; Ozmen, M.; Sello, J.; Weber, P. M.; Reda, S.; Rose, C.; Kim, E.; Rubenstein, B. M.; Rosenstein, J. K. "Multicomponent molecular memory" *Nature Commun.*, **2020**, *11*, 691.

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33. Dombroski, A.; Oakley, K.; Arcadia, C.; Nourael, F.; Ling, S.; Rosenstein, J.; Reda, S.; Kim E. "Implementing parallel arithmetic via acetylation and its application to chemical image Processing" *Proc. R. Soc. A.* **2021**, *477*, 20200899.

34. Oakley, K. M.; Zhao, Z.; Lehane, R. L.; Ma, J.; Kim E. Generation of H_2S from Thiol-Dependent NO Reactivity of Model [4Fe-4S] Cluster and Roussin's Black Anion. *Inorg. Chem.* **2021**, *21*, 15910–15917.

35. Arcadia, C.E.; Dombroski, A.; Oakley, K.; Chen, S. L.; Tann, H.; Rose, C.; Kim, E.; Reda, S.; Rubenstein, B.M.; Rosenstein, J.K. "Leveraging autocatalytic reactions for chemical domain image classification" *Chem. Sci.* **2021**, *12*, 5464-5472.

36. Oakley, K. M.; Sterling, K.; Shearer, J.; Kim, E. Controlled Protonation of [2Fe-2S] Leading to MitoNEET Analogues and Concurrent Cluster Modification. *Inorg. Chem*. **2021**, *21*, 16074–16078.

37. Lehnert, N.; Kim, E.; Dong, H. T.; Harland, J. B.; Hunt, A. P.; Manickas, E. C.; Oakley, K. M.; Pham, J.; Reed, G. C.; Alfaro, V. S. "The Biologically Relevant Coordination Chemistry of Iron and Nitric Oxide: Electronic Structure and Reactivity." *Chem. Rev.* **2021**, *121*, 14682–14905. ***Selected for the journal auxiliary cover***

38. Oakley, K. M.; Lehane, R. L; Zhao, Z.; Kim, E." Dioxygen reactivity of a biomimetic [4Fe-4S] compound exhibits [4Fe-4S] to [2Fe-2S] cluster conversion". *J. Inorg. Biochem.* **2022**, *228*, 111714.

39. Agiza, A. A.; Oakley, K.; Rosenstein, J.; Rubenstein, B. M.; Kim, E.; Riedel, M.; Reda, S. "Digital circuits and neural networks based on acid-base chemistry implemented by robotic fluid handling" *Nat. Commun.* **2023**, *14,* 496.

(Patent):

Rubenstein, B. M.; Rosenstein, J. K.; Arcadia, C. E.; Chen, S.-L.; Dombroski, A.; Geiser. J.; Kennedy, E.; Kim, E.; Reda, S.; Oakley, K.; Rose, C.; Sello, J.; Tann, H.; Weber, P. M. "Method of Chemical Computation" (August 17, 2021. US 11,093,865 B2)

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