

Danna E. Freedman

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Appointments

F. G. Keyes Professor of Chemistry, Massachusetts Institute of Technology	2021
Professor, Department of Chemistry, Northwestern University	2020 – 2021
Associate Professor, Department of Chemistry, Northwestern University	2018 – 2020
Assistant Professor, Department of Chemistry, Northwestern University	2012 – 2018
NSF-ACC Postdoctoral Fellow, Massachusetts Institute of Technology	2009 – 2012

Education

Postdoctoral Fellow, Massachusetts Institute of Technology	2012
Advisor: Prof. Daniel G. Nocera	
Ph.D. Inorganic Chemistry, University of California, Berkeley,	2009
Advisor: Prof. Jeffrey R. Long Thesis: <i>Increasing Anisotropy in Single-Molecule Magnets</i>	
A. B. Chemistry <i>cum laude</i> Harvard University	2003
Advisor: Prof. Hongkun Park	

Awards and Honors

Presidential Early Career Award for Scientists and Engineers (PECASE) via NSF	2019
ACS Award in Pure Chemistry	2019
Kavli Fellow	2018
Camille Dreyfus Teacher-Scholar Award	2018
Presidential Early Career Award for Scientists and Engineers (PECASE) via DoD	2017
NSF CAREER Award	2015
Searle Teaching Fellow	2014
A. P. Sloan Research Fellow	2015
Camille and Henry Dreyfus Environmental Mentor	2016
Air Force Office of Scientific Research Young Investigator Program	2014
Initiative for Sustainability and Energy at Northwestern Booster Award	2012
NSF-American Competitiveness in Chemistry Fellowship	2010
Tyco Electronics Graduate Fellowship	2008
France-Berkeley Fund Fellowship	2007

Publications

- (67) von Kugelgen, S. W.; Krzyaniak, M. D.; Gu, M.; Puggioni, D.; Rondinelli, J. M.; Wasielewski, M. R.; Freedman, D. E. Spectral Addressability in a Modular Two Qubit System *J. Am. Chem. Soc.* **2021**.
- (66) Yu, C.-J.; von Kugelgen, S. W.; Laorenza, D. W.; Freedman, D. E. A Molecular Approach to Quantum Sensing *ACS Cent. Sci.* **2021**, DOI: 10.1021/acscentsci.0c00737.

- (65) A. B.; Tamerius, A. D.; Koocher, N. Z.; Meng, Y.; Pickard, C.; Walsh, J. P. S.; Rondinelli, J. M.; Jacobsen, S. D.; Freedman, D. E. Computationally Directed Discovery of MoBi_2 *J. Am. Chem. Soc.* **2021**, *143*, 214–222.
- (64) Li, C.; Lau, G. C.; Yuan, H.; Aggarwal, A.; Dominguez, V. L.; Liu, S.; Sai, H.; Palmer, L. C.; Sather, N. A.; Pearson, T. J.; Freedman, D. E.; Amiri, P. K.; Olvera de la Cruz, M.; Stupp, S. I. Fast and Programmable Locomotion of Hydrogel–Metal Hybrids under Light and Magnetic Fields *Sci. Robot.* **2020**, *5*, DOI: 10.1126/scirobotics.abb9822.
- (63) Fataftah, M. S.; Bayliss, S. L.; Laorenza, D. W.; Wang, X.; Wilson, B.; Mintun, P. J.; Diler, B.; Phelan, B.; Wasielewski, M. R.; Han, S.; Sherwin, M.; Awschalom, D. D.; Freedman, D. E. A Trigonal Bipyramidal V^{3+} Complex as an Optically Addressable Molecular Qubit Candidate *J. Am. Chem. Soc.* **2020**, *142*, 20400–20408.
- (62) Yu, C.-J.; von Kugelgen, S. W.; Krzyaniak, M. D.; Ji, W.; Dichtel, W. R.; Wasielewski, M. R.; Freedman, D. E. Spin and Phonon Design in Modular Arrays of Molecular Qubits *Chem. Mater.* **2020**, *32*, 10200–10206.
- (61) Jain, S. K.; Yu, C.-J.; Wilson, C. B.; Tabassum, T.; Freedman, D. E.; Han, S. Tracing Dynamic Nuclear Polarization Pathways Using Transition Metal–Nuclear Spin Rulers *Jain, S. K.; Yu, C.-J.; Wilson, C. B.; Tabassum, T.; Freedman, D. E.; Han, S. Chem* **2020**, *7*, 1–15.
- (60) Bayliss, S. L.*; Laorenza, D. W.*; Mintun, P. J.; Diler, B.; Freedman, D. E.; Awschalom, D. D. Optically Addressable Molecular Spins for Quantum Information Processing *Science* **2020**, *370*, 1309–1312. *These authors contributed equally to this work.
- (59) Coste, S. C.; Pearson, T. J.; Altman, A. B.; Klein, R. A.; Finney, B. A.; Hu, M. Y.; Alp, E. E.; Vlaisavljevich, B.; Freedman, D. E. Orbital Energy Mismatch Engenders High-Spin Ground States in Heterobimetallic Complexes *Chem. Sci.*, **2020**, *11*, 9971–9977.
- (58) Wojnar, M. K.; Laorenza, D. W.; Schaller, R.; Freedman, D. E. Nickel(II) Metal Complexes as Optically Addressable Qubit Candidates *J. Am. Chem. Soc.* **2020**, *142*, 14826–14830.
- (57) Wasielewski, M. R.; Forbes, M. D. E.; Frank, N. L.; Kowalski, K.; Scholes, G. D.; Yuen-Zhou, J.; Baldo, M. A.; Freedman, D. E.; Goldsmith, R. H.; Goodson, III, T.; Kirk, M. L.; McCusker, J. K.; Ogilvie, J. P.; Schultz, D. A.; Stoll, S.; Whaley, K. B. Exploiting Chemistry and Chemical Systems for Quantum Information Science *Nat. Rev. Chem.* **2020** *4*, 490–504.
- (56) Klein, R. A.; Walsh, J. P. S.; Clarke, S. M.; Liu, Z.; Alp, E. E.; Bi, W.; Meng, Y.; Altman, A. B.; Chow, P.; Xiao, Y.; Norman, M. R.; Rondinelli, J. M.; Jacobsen, S. D.; Puggioni, D.; Freedman, D. E. Pressure Induced Collapse of Magnetic Order in Jarosite *Phys. Rev. Lett.* **2020**, *125*, 077202.
- (55) Mian, M. R.; Afrin, U.; Fataftah, M.; Idrees, K.; Islamoglu, T.; Freedman, D. E.; Farha, O. K. Control of the Porosity in Manganese Trimer–Based Metal Organic Frameworks by Linker Functionalization *Inorg. Chem.* **2020**, *59*, 8444–8450.
- (54) Collins, K. A.; Freedman, D. E. Taking Titanium for a spin *Nat. Chem.* **2020**, *12*, 670–671.

- (53) Collins, K. A.; Saballos, R. J.; Fataftah, M. S.; Puggioni, D.; Rondinelli, J. M.; Freedman, D. E. Synthetic Investigation of Competing Magnetic Interactions in 2D Metal–Chloranilate Radical Frameworks *Chem. Sci.* **2020**, *11*, 5922–5928.
- (52) von Kugelgen, S.; Freedman, D. E.; A Chemical Path to Quantum Information *Science* **2019**, *366*, 1070–1071
- (51) Sinha, M.; Pearson, T. J.; Scheie, A. O.; Reeder, T. R.; Vivanco, H. K.; Freedman, D. E.; Phelan, W. A.; McQueen, T. M. Controlled Introduction of Spin Centers in Single Crystals of Ba₂CaWO_{6-δ} *Phys. Rev. Mater.* **2019**, *3*, 64411.
- (50) Coste, S. C.; Pearson, T. J.; Freedman, D. E. Magnetic Anisotropy in Heterobimetallic Complexes *Inorg. Chem.*, **2019**, *58*, 11893–11902.
- (49) Fataftah, M. S.; Krzyaniak, M.; Vlaisavljevich, B.; Wasielewski, M. R.; Zadrozny, J. M.; Freedman, D. E. Metal–Ligand Covalency Enables Room Temperature Molecular Qubit Candidates *Chem. Sci.*, **2019**, *10*, 6707–6714.
- (48) Klein, R. A.; Altman, A. B.; Saballos, R. J.; Walsh, J. P. S.; Tamerius, A. D.; Meng, Y.; Puggioni, D.; Rondinelli, J. M.; Jacobsen, S. D.; Freedman, D. E. High-Pressure Synthesis of the BiVO₃ Perovskite *Phys. Rev. Mater.*, *Accepted*.
- (47) Walsh, J. P. S.; Clarke, S. M.; Puggioni, D.; Tamerius, A. D.; Meng, Y.; Rondinelli, J. M.; Jacobsen, S. D.; Freedman, D. E. MnBi₂: A Metastable High-Pressure Phase in the Mn–Bi System *Chem. Mater.* **2019**, *31*, 3083–3088.
- (46) Clarke, S. M.; Powderly, K. M.; Walsh, J. P. S.; Yu, T.; Wang, Y.; Meng, Y.; Jacobsen, S. D.; Freedman, D. E. Controlling Dimensionality in the Ni–Bi System with Pressure *Chem. Mater.* **2019**, *31*, 955–959.
- (45) Fataftah, M.S.; Freedman, D. E. Progress towards creating optically addressable qubits *Chem. Commun.* **2018**, *54*, 13773–13781.
- (44) Yu, C.-J.; Krzyaniak, M.; Fataftah, M. S.; Wasielewski, M. R.; Freedman, D. E. A Concentrated Array of Copper Porphyrin Candidate Qubits *Chem. Sci.* **2019**, *10*, 1702–1708.
- (43) Pearson, T. J.; Freedman, D. E. Size Determines Efficacy of Nanoparticle Magnetoresistance *ACS Cent. Sci.* **2018**, *4*, 1092–1094.
- (42) Tamerius, A. D.; Clarke, S. M.; Gu, M.; Walsh, J. P. S.; Esters, M.; Meng, Y.; Hendon, C. H.; Rondinelli, J. M.; Jacobsen, S. D.; Freedman, D. E. Discovery of Cu₃Pb *Angew. Chem. Int. Ed.* **2018**, *57*, 12809–12813.
- (41) Klein, R. A.; Walsh, J. P. S.; Clarke, S. M.; Guo, Y.; Bi, W.; Fabbris, G.; Meng, Y.; Haskel, D.; Alp, E. E.; Van Duyne, R. P.; Jacobsen, S. D.; Freedman, D. E. Impact of Pressure on Magnetic Order in Jarosite *J. Am. Chem. Soc.* **2018**, *140*, 12001–12009.
Highlighted in a *JACS* Spotlight, a Science Highlight by the Advanced Photon Source at Argonne National Laboratory, a HPCAT Science Highlight, and was selected for a *JACS* front cover
- (40) Pearson, T. J.; Laorenza, D.; Krzyaniak, M.; Wasielewski M. R.; Freedman, D. E. Octacyanometallate Qubit Candidates *Dalton Trans.* **2018**, *47*, 11744–11748.
- (39) Walsh, J. P. S.; Freedman, D. E. High-Pressure Synthesis: A New Frontier in the Search for Next-Generation Intermetallic Compounds *Acc. Chem. Res.* **2018**, *51*, 1315–1323.

- (38) Powderly, K. M.; Clarke, S. M.; Amsler, M.; Wolverton, C.; Malliakas, C. D.; Meng, Y.; Jacobsen, S. D.; Freedman, D. E. High-pressure discovery of β -NiBi *Chem. Commun.* **2017**, *53*, 11241–11244.
- (37) Graham, M. J.; Krzyaniak, M.; Wasielewski, M. R.; Freedman, D. E. Probing Nuclear Spin Effects on Electronic Spin Coherence via EPR Measurements of Vanadium (IV) Complexes *Inorg. Chem.* **2017**, *56*, 8106–8113.
- (36) Coste, S. C.; Vlaisavljevich, B.; Freedman, D. E. Magnetic Anisotropy from Main-Group Elements: Halides versus Group 14 Elements *Inorg. Chem.* **2017**, *56*, 8195–8202.
- (35) Clarke, S. M.; Amsler, M.; Walsh, J. P. S.; Yu, T.; Wang, Y.; Meng, Y.; Jacobsen, S. D.; Wolverton, C.; Freedman, D. E. Creating Binary Cu–Bi Compounds via High-Pressure Synthesis: A Combined Experimental and Theoretical Study *Chem. Mater.* **2017**, *29*, 5276–5285.
Highlighted as part of the Emerging Investigators in Solid-State Inorganic Chemistry virtual issue
- (34) Zadrozny, J. M.; Gallagher, A. T.; Harris, T. D.; Freedman, D. E. A Porous Array Of Clock Qubits *J. Am. Chem. Soc.* **2017**, *39*, 7089–7094.
Highlighted in the *JACS* Young Investigator virtual issue
- (33) Graham, M. J.; Zadrozny, J. M.; Fataftah, M. S.; Freedman, D. E. Forging Solid-State Qubit Design Principles in a Molecular Furnace *Chem. Mater.* **2017**, *29*, 1885–1897.
- (32) Graham, M. J.; Yu, C.; Krzyaniak, M.; Wasielewski, M.; Freedman, D. E. Synthetic Approach to Determine the Effect of Nuclear Spin Distance on Electronic Spin Decoherence *J. Am. Chem. Soc.* **2017**, *139*, 3196–3201.
Highlighted in the *JACS* Young Investigator virtual issue
- (31) Walsh, J. P. S.; Freedman, D. E. Preview Article: Using Supramolecular Chemistry to Build Quantum Logic Gates *Chem* **2016**, *1*, 668–669.
- (30) Walsh, J. P. S.; Clarke, S. M.; Meng, Y.; Jacobsen, S. D.; Freedman, D. E. Discovery of FeBi₂ *ACS Cent. Sci.* **2016**, *2*, 867–871.
Highlighted by *Science*, *ACS Central Science*, *Chemistry World*, *C&E News*, *Chemistry Views*, *Phys.org*, *Futurism*, *HPCAT*, and *CDAC*, and was also featured on the *ACS Central Science* homepage
- (29) Yu, C.; Graham, M. J.; Zadrozny, J. M.; Niklas, J.; Krzyaniak, M.; Wasielewski, M. R.; Poluektov O. G.; Freedman, D. E. Long Coherence Times in Surface-Compatible Nuclear Spin-Free Vanadium Qubits *J. Am. Chem. Soc.* **2016**, *138*, 14678–14685.
- (28) Clarke, S. M.; Walsh, J. P. S.; Amsler, M.; Yu, T.; Goedecker, S.; Wang, Y.; Wolverton, C.; Freedman, D. E. Discovery of a Superconducting Cu–Bi Intermetallic Compound via High-pressure Synthesis *Angew. Chem. Int. Ed.* **2016**, *55*, 13446–13449.
- (27) Pearson, T. J.; Fataftah, M. S.; Freedman, D. E. Enhancement of Magnetic Anisotropy in a Mn–Bi Heterobimetallic Complex. *Chem. Commun.* **2016**, *52*, 11394–11397.
- (26) Zadrozny, J. M.; Graham, M. J.; Krzyaniak, M. D.; Wasielewski, M. R.; Freedman, D. E. Unexpected Suppression of Spin-Lattice Relaxation via High Magnetic Field in a High-Spin Iron(III) Complex *Chem. Commun.* **2016**, *52*, 10175–10178.

- (25) Fataftah, M. S.; Coste, S. C.; Vlaisavljevich, B.; Zadrozny, J. M.; Freedman, D. E. Transformation of the Coordination Complex $[\text{Co}(\text{C}_3\text{S}_5)_2]^{2-}$ from a Molecular Magnet to a Potential Qubit *Chem. Sci.* **2016**, *7*, 6160–6166.
- (24) Fataftah, J. S.; Zadrozny, J. M.; Coste, S. C.; Graham, M. J.; Rogers, D. M.; Freedman, D. E. Employing Forbidden Transitions as Qubits in a Nuclear Spin-Free Chromium Complex *J. Am. Chem. Soc.* **2016**, *138*, 1344–1348.
- (23) Zadrozny, J. M.; Freedman, D. E.; Qubit Control Limited by Spin–Lattice Relaxation in a Nuclear Spin-Free Iron(III) Complex *Inorg. Chem.* **2015**, *54*, 12027–12031.
- (22) Zadrozny, J. M.; Niklas, J.; Poluektov, O. G.; Freedman, D. E. Millisecond Coherence Time in a Tunable Molecular Electronic Spin Qubit *ACS Cent. Sci.* **2015**, *1*, 488–492.
Highlighted by *ACS Central Science*, *Daily Mail*, and *Phys.org*
- (21) Zadrozny, J. M.; Greer, S.; Hill, S.; Freedman, D. E. A Flexible Iron(II) Complex in which Zero-Field Splitting is Resistant to Structural Variation *Chem. Sci.* **2015**, *7*, 416–423.
- (20) Clarke, S. M.; Freedman, D. E. $(\text{BiSe})_{1.23}\text{CrSe}_2$ and $(\text{BiSe})_{1.22}(\text{Cr}_{1.2}\text{Se}_2)_2$: Magnetic Anisotropy in the First Structurally Characterized Bismuth–Chromium–Selenide Ternary Phases *Inorg. Chem.*, **2015**, *54*, 2765–2771.
- (19) Zadrozny, J. M.; Niklas, J.; Poluektov, O. G.; Freedman, D. E. Multiple Quantum Coherences from Hyperfine Transitions in a Vanadium(IV) Complex *J. Am. Chem. Soc.* **2014**, *136*, 15841–15844.
- (18) Fataftah, M. S.; Zadrozny, J. M.; Rogers, D. M.; Freedman, D. E. A Mononuclear Transition Metal Single-Molecule Magnet in a Nuclear Spin-Free Ligand Environment *Inorg. Chem.* **2014**, *53*, 10716–10721.
- (17) Graham, M. G.; Zadrozny, J. M.; Shiddiq, M.; Anderson, J. S.; Fataftah, M. S.; Hill, S.; Freedman, D. E. Influence of Electronic Spin and Spin–Orbit Coupling on Decoherence in Mononuclear Transition Metal Complexes *J. Am. Chem. Soc.* **2014**, *136*, 7623–7626.
Highlighted by *JACS* and the National High Magnetic Field Laboratory
- (16) Rondinelli, J. R.; Benedek, N. A.; Freedman, D. E.; Kavner, A.; Rodriguez, E. E.; Toberer, E. S.; Martin, L. W. Accelerating Functional Materials Discovery *Am. Ceram. Soc. Bull.* **2013**, *92*, 14.

Doctoral and Postdoctoral Research

- (15) Chisnell, R.; Helton, J. S.; Freedman, D. E.; Singh, D. K.; Demmel, F.; Stock, C.; Nocera, D. G.; Lee, Y. S. Magnetic Transitions in the Topological Magnon Insulator $\text{Cu}(1,3\text{-bdc})$ *Phys. Rev. B* **2016**, *93*, 214403.
- (14) Chisnell, R.; Helton, J. S.; Freedman, D. E.; Singh, D. K.; Bewley, R. I.; Nocera, D. G.; Lee, Y. S. Topological Magnon Bands in a Kagome Lattice Ferromagnet *Phys. Rev. Lett.* **2015**, *115*, 147201.
- (13) Han, T.-H.; Chisnell, R.; Bonnoit, C. J.; Freedman, D. E.; Zapf, V. S.; Harrison, N.; Nocera, D. G.; Takano, Y.; Lee, Y. S. Thermodynamic Properties of the Quantum Spin Liquid Candidate $\text{ZnCu}_3(\text{OH})_6\text{Cl}_2$ in High Magnetic Fields *arXiv:1402.2693* [cond-mat.str-el].

- (12) Freedman, D. E.; Chisnell, R.; McQueen, T. M.; Lee, Y. S.; Payen, C.; Nocera, D. G. Frustrated Magnetism in a Ni^{2+} kagomé lattice $\text{BaNi}_3(\text{OH})_2(\text{VO}_4)_2$ *Chem. Commun.* **2012**, 48, 64–66.
- (11) McQueen, T. M.; Han, T. H.; Freedman, D. E.; Stephens, P. W.; Lee, Y. S.; Nocera, D. G. $\text{CdCu}_3(\text{OH})_6\text{Cl}_2$: A New Layered Hydroxide Chloride *J. Solid State Chem.* **2011**, 184, 3319–3323.
- (10) Groysman, S.; Villagran, D.; Freedman, D. E.; Nocera, D. G. Dinitrogen binding at vanadium in a tris(alkoxide) ligand environment *Chem. Commun.* **2011**, 47, 10242–10244.
- (9) Harman, W. H.; Harris, T. D.; Freedman, D. E.; Fong, H.; Chang, A.; Rinehart, J. D.; Ozarowski, A.; Sougrati, M. T.; Grandjean, F.; Long, G.; Long, J. R.; Chang, C. Slow Magnetic Relaxation in a Family of Trigonal Pyramidal Iron(II) Pyrrolide Complexes *J. Am. Chem. Soc.* **2010**, 132, 18115–18126.
- (8) Freedman, D. E.; Han, T. H.; Prodi, A.; Muller, P.; Huang, Q.-Z.; Chen, Y.-S.; Webb, S. M.; Lee, Y. S.; McQueen, T.M.; Nocera, D. G. Site Specific X-ray Anomalous Dispersion of the Geometrically Frustrated Kagomé Magnet, Herbertsmithite, $\text{ZnCu}_3(\text{OH})_6\text{Cl}_2$ *J. Am. Chem. Soc.* **2010**, 132, 16185–16190.
- (7) Zadrozny, J. M.; Freedman, D. E.; Jenkins, D. M.; Harris, T. D.; Iavarone, A. T.; Harte, E.; Mathonière, C.; Clérac, R.; Long, J. R. Slow Magnetic Relaxation and Charge Transfer in Cyano-Bridged Coordination Clusters Incorporating $[\text{Re}(\text{CN})_7]^{4-/3-}$ *Inorg. Chem.* **2010**, 49, 8886–8896.
- (6) Chu, S.; McQueen, T. M.; Chisnell, R.; Freedman, D. E.; Muller, P.; Lee, Y. S.; Nocera, D. G. A Cu^{2+} ($S = 1/2$) Kagomé Antiferromagnet: $\text{Mg}_x\text{Cu}_{4-x}(\text{OH})_6\text{Cl}_2$ *J. Am. Chem. Soc.* **2010**, 132, 5570–5571.
- (5) Freedman, D. E.; Harman, W. H.; Harris, T. D.; Long, G. J.; Chang, C. J.; Long, J. R. Slow Magnetic Relaxation in a High-Spin Iron (II) Complex *J. Am. Chem. Soc.* **2010**, 132, 1224–1225.
- (4) Freedman, D. E.; Jenkins, D. M.; Long, J.R. Strong magnetic exchange coupling in the cyano-bridged coordination clusters $[(\text{PY5Me}_2)_4\text{V}_4\text{M}(\text{CN})_6]^{5+}$ ($\text{M} = \text{Cr}, \text{Mo}$) *Chem. Commun.* **2009**, 4829–4831.
- (3) Freedman, D. E.; Jenkins, D. M.; Iavarone, A. T.; Long, J. R. A Redox-Switchable Single-Molecule Magnet Incorporating $[\text{Re}(\text{CN})_7]^{3-}$ *J. Am. Chem. Soc.* **2008**, 130, 2884–2885.
- (2) Freedman, D. E.; Bennett, M. V.; Long, J. R. Symmetry-Breaking Substitutions of $[\text{Re}(\text{CN})_8]^{3-}$ into the Centered, Face-Capped Octahedral Clusters $(\text{CH}_3\text{OH})_{24}\text{M}_9\text{M}'_6(\text{CN})_{48}$ ($\text{M} = \text{Mn}, \text{Co}$; $\text{M}' = \text{Mo}, \text{W}$) *Dalton Trans.* **2006**, 2829–2834.
- (1) Escalada, J.; Freedman, D.; Werner, E. J. 2,3-Dihydroxy-*N*-methylbenzamide monohydrate *Acta Cryst.* **2004**, E60, o1296–o1298.

Invited Lectures

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|-------|---|-------------|
| (115) | <i>International Conference on Molecule Based Magnets</i> | June, 2021 |
| | <i>Manchester, UK (virtual)</i> | |
| (114) | <i>Quantum sensing workshop CQE (virtual)</i> | April, 2021 |
| (113) | <i>University of Manchester, UK (virtual)</i> | April, 2021 |
| (112) | <i>Naval Research Laboratory (virtual)</i> | April, 2021 |

(111)	<i>ACS Harry Gray Award for Creative Work in Inorganic Chemistry by a Young Investigator (2020): Symposium Honoring Hemamala I. Karunadasa (virtual)</i>	March, 2021
(110)	<i>Uppsala University, Sweden (virtual)</i>	January, 2021
(109)	<i>AAAS Annual Meeting (virtual)</i>	January, 2021
(108)	<i>2020 Virtual MRS Spring/Fall Meeting, live presentation</i>	December, 2020
(107)	<i>Cornell Department of Chemistry (virtual)</i>	November, 2020
(106)	<i>RSC Solid State Chemistry Group Webinars 2020 (virtual)</i>	October, 2020
(105)	<i>University of Tennessee Department of Chemistry (virtual)</i>	October, 2020
(104)	<i>2020 CINT Annual Meeting, Los Alamos National Laboratory (virtual)</i>	September, 2020
(103)	<i>Symposium: Understanding Materials for Quantum Information Processing (virtual)</i>	August, 2020
(102)	<i>Quantum Huddle (virtual)</i>	July, 2020
(101)	<i>American Physical Society March meeting (virtual)</i>	March, 2020
(100)	<i>Quantum Sensing Workshop Chicago, IL</i>	December, 2019
(99)	<i>Materials Chemistry Frontiers Symposium Evanston, IL</i>	December, 2019
(98)	<i>The Ohio State University, Columbus, OH</i>	November, 2019
(97)	<i>Johns Hopkins University, Baltimore MD</i>	October, 2019
(96)	<i>Princeton University, Princeton, NJ</i>	October, 2019
(96)	<i>IBS Conference on Quantum Nanoscience Seoul South Korea</i>	September 2019
(95)	<i>Spotlight on Research: Danna Freedman on Quantum Information Science; DOE/NSF booth ACS San Diego San Diego CA</i>	
(94)	<i>ACS San Diego, Award talk in Symposium in Honor of Danna Freedman's ACS Award in Pure Chemistry, San Diego, CA</i>	August, 2019
(93)	<i>EPR Symposium, 2019 Rocky Mountain Conference on Magnetic Resonance, Denver, CO</i>	July, 2019
(92)	<i>University of Florida, Gainesville, FL</i>	June, 2019
(91)	<i>Spintech X, Chicago, IL</i>	June, 2019
(90)	<i>Molecular Foundry, Lawrence Berkeley National Lab, Berkeley, CA</i>	June, 2019
(89)	<i>Caltech, Pasadena, CA</i>	May, 2019
(88)	<i>University of California, Irvine, Irvine, CA</i>	April, 2019
(87)	<i>Johns Hopkins University, Baltimore MD</i>	April, 2019
(86)	<i>ACS National Meeting: Magnetism across length scales, Orlando, FL</i>	April, 2019
(85)	<i>ACS National Meeting: Symposium in honor of Jeffrey Long's F. A. Cotton Award, Orlando, FL</i>	April, 2019
(84)	<i>Michigan State University, East Lansing, MI</i>	January, 2019
(83)	<i>Duke University, Durham, NC</i>	December, 2018
(82)	<i>DOE CSGB Council workshop on Quantum Information Science, Gaithersburg, MD</i>	November, 2018
(81)	<i>Massachusetts Institute of Technology, Cambridge, MA</i>	November, 2018
(80)	<i>Argonne National Laboratory, Argonne IL</i>	November, 2018

(79)	<i>University of Chicago</i> , Chicago, IL	November, 2018
(78)	<i>ACS Midwest Regional Meeting</i> , Ames IA	October, 2018
(77)	<i>University of California, Berkeley</i> , Berkeley, CA	October, 2018
(76)	<i>Princeton University</i> , Princeton, NJ	September, 2018
(75)	<i>University of Wisconsin, Madison</i> , Madison, WI	September, 2018
(74)	<i>International Conference on Coordination Chemistry</i> , Sendai, Japan	August, 2018
(73)	<i>Solid State GRC</i> , New London, NH	July, 2018
(72)	<i>Miller Institute Symposium</i> , Marshall, CA	June, 2018
(71)	<i>51st Annual International Meeting of the EPR spectroscopy group of the Royal Society of Chemistry</i> , London, UK	April, 2018
(70)	<i>ACS National Meeting: ACS Award in Pure Chemistry: Symposium in Honor of Mircea Dincă</i>	March, 2018
(69)	<i>ACS National Meeting: Cold Molecules for Chemistry</i>	March, 2018
(68)	<i>Texas A & M College Station</i> , TX	March, 2018
(67)	<i>Kavli Frontiers of Science Symposium</i> Irvine, CA	February, 2018
(66)	<i>University of Washington</i> , Seattle, WA	February, 2018
(65)	<i>Physics and Chemistry of Surfaces and Interfaces</i> Kona, HI	January, 2018
(64)	<i>Iowa State</i> , Ames IA	December, 2017
(63)	<i>North Carolina State University</i> Raleigh, NC	September 2017
(62)	<i>Exploring quantum phenomena and quantum matter in ultrahigh magnetic fields: NSF Workshop</i> Alexandria, VA	September 2017
(61)	<i>ACS National Meeting: Personal and Global Energy Conversion in Chemistry and Biology Symposium</i> , Washington, DC	August, 2017
(60)	<i>North American Solid State Chemistry Conference</i> , Santa Barbara, CA	August, 2017
(59)	<i>Quantum Summer School</i> , Johns Hopkins University	June, 2017
(58)	<i>Canadian Society of Chemistry, Metal and Covalent Organic Frameworks</i> Toronto, Canada	May, 2017
(57)	<i>University of California, Irvine</i> , Irvine, CA	May, 2017
(56)	<i>University of California, Los Angeles</i> , Los Angeles, CA	May, 2017
(55)	<i>University of California, Santa Barbara</i> Santa Barbara, CA	May, 2017
(54)	<i>University of Pittsburgh</i> , Pittsburgh, PA	April, 2017
(53)	<i>ISACS: Challenges In Inorganic Chemistry, Plenary Speaker</i> , Manchester UK	April, 2017
(52)	<i>ACS National Meeting: Celebrating 60 Years of the Division of Inorganic Chemistry</i> , San Francisco, CA	April, 2017
(51)	<i>Caltech Pasadena</i> , CA	March, 2017
(50)	<i>Michigan State University</i> East Lansing, MI	March, 2017
(49)	<i>Massachusetts Institute of Technology</i> Cambridge, MA	March, 2017
(48)	<i>Florida State University</i> Tallahassee FL	February, 2017
(47)	<i>University of Florida, Gainesville</i> , FL	February, 2017
(46)	<i>Harvard University</i> , Cambridge, MA	February, 2017
(45)	<i>Columbia University</i> , New York, NY	February, 2017

(44)	<i>University of California, Berkeley</i> , Berkeley, CA	February, 2017
(43)	<i>Stanford University</i> , Stanford, CA	February, 2017
(42)	<i>Pennsylvania State University</i> , State College, PA	November, 2016
(41)	<i>Colorado State University</i> , Fort Collins, CO	October, 2016
(40)	<i>International Meeting on Spins in Organic Semiconductors</i> , Chicago, IL	October, 2016
(39)	<i>University of Pennsylvania</i> , Philadelphia, PA	September 2016
(38)	<i>Osaka City University International Conference</i> , Osaka, Japan	September 2016
(37)	<i>Conductivity & Magnetism in Molecular Materials Gordon Research Conference</i> , Biddeford, ME	August, 2016
(36)	<i>Inorganic Gordon Research Conference</i> , Biddeford, ME	June, 2016
(35)	<i>Rensselaer Polytechnic Institute Student Invited Seminar</i> , Troy, NY	May, 2016
(34)	<i>ACS National Meeting: ACS Award in Inorganic Chemistry: Symposium in honor of Mercuri G. Kanatzidis</i> , San Diego, CA	March, 2016
(33)	<i>University of California, San Diego</i> , San Diego, CA	January, 2016
(32)	<i>Pacifichem</i> , Bismuth Symposium, Honolulu, HI	December, 2015
(31)	<i>European Materials Research Science Conference</i> , Warsaw, Poland	September 2015
(30)	<i>Indiana University</i> , Bloomington, IN	September, 2015
(29)	<i>ACS National Meeting Synthetic Chemistry Approaches to Magnetic Materials Symposium</i> , Boston, MA	August, 2015
(28)	<i>Zero-field Spin Effects in Chemical Systems</i> , Telluride, CO	June, 2015
(27)	<i>Awaji International Workshop on Electron Spin Science & Technology: Biological and Materials Science Oriented Applications</i> , Awaji, Japan	June, 2015
(26)	<i>North America-Greece-Cyprus Workshop on Paramagnetic Materials</i> , Athens Greece	June, 2015
(25)	<i>ACS National Meeting</i> , ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry in Honor of Kim R. Dunbar – Denver, CO,	March, 2015
(24)	<i>Quantum Technology</i> , Manchester, England	January, 2015
(23)	<i>Institute for Molecular Engineering University of Chicago</i>	November, 2014
(22)	<i>ACS National Meeting</i> , Inorganic Chemistry Lectureship Award: Symposium in Honor of Jeffrey R. Long <i>San Francisco, CA</i>	August, 2014
(21)	<i>ACS National Meeting ExxonMobil Solid State Chemistry Faculty Fellow Award: Symposium in Honor of Daniel Fredrickson</i> , <i>San Francisco, CA</i>	August, 2014
(20)	<i>International Conference on Molecule-Based Magnets</i> , St. Petersburg, Russia	July, 2014
(19)	<i>Inorganic Gordon Research Conference</i> , Biddeford, ME	June, 2014

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| (18) | <i>University of Illinois, Champaign Urbana, Department of Physics</i> | April, 2014 |
| (17) | <i>ACS National Meeting A Celebration of Crystallography in Solid State and Materials Chemistry: Complex Problems and New Solutions in Inorganic Small Molecule Crystallography, Dallas, TX</i> | March, 2014 |
| (16) | <i>Missouri University of Science and Technology, Rolla, MO</i> | October, 2013 |
| (15) | <i>National High Magnetic Field Laboratory, Tallahassee, FL</i> | August, 2013 |
| (14) | <i>Argonne National Laboratory, Argonne, IL</i> | July, 2013 |
| (13) | <i>UC Santa Barbara, Santa Barbara, CA</i> | January, 2012 |
| (12) | <i>UC Irvine, Irvine, CA</i> | January, 2012 |
| (11) | <i>University of Chicago, Chicago, IL</i> | January, 2012 |
| (10) | <i>Princeton University, Princeton NJ</i> | January, 2012 |
| (9) | <i>Northwestern University, Evanston, IL</i> | December, 2011 |
| (8) | <i>University of Minnesota, Minneapolis, MN</i> | December, 2011 |
| (7) | <i>Harvard University, Cambridge, MA</i> | December, 2011 |
| (6) | <i>Oregon State University, Corvallis, OR</i> | December, 2011 |
| (5) | <i>Stanford University, Stanford CA</i> | December, 2011 |
| (4) | <i>Rutgers University, New Brunswick NJ</i> | November, 2011 |
| (3) | <i>UC Berkeley, Berkeley, CA</i> | May, 2011 |
| (2) | <i>Bruker-MIT Symposium, Cambridge, MA</i> | February, 2010 |
| (1) | <i>Centre Recherche de Paul Pascal University of Bordeaux, Bordeaux, France</i> | February, 2008 |

Teaching

Professor: General Chemistry, Chem 132	2018, 2020, 2021
Professor: General Chemistry, Chem 103	2013 – 2017
Professor: Graduate Inorganic Chemistry, Chem 434	2014 – 2019
Teaching Assistant: General Chemistry and Quantitative Analysis Part II	2005
Teaching Assistant: General Chemistry and Quantitative Analysis Part I	2004
Teaching Assistant: General Chemistry	2003

Leadership and Service

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| (1) Northwestern's initiative on Quantum Information Science INQUIRE Board;
Quantum Task Force for the Vice President for Research's Office | 2019 |
| (2) Editorial Advisory Board Member
Cell Reports Physical Science, Accounts of Chemical Research | 2019 |
| (3) Chair Chemistry Graduate Admission and Recruiting Committee | 2018–2020 |
| (4) Shaping quantum information research directions: NSF and DOE workshop
participant and report co-author | 2017– |
| (a) Co-author of a BES workshop report on QIS DOE entitled "Opportunities for Basic | |

Research for Next Generation Quantum Systems.”

- (b) NSF Quantum Information for Chemistry workshop report co-author
- (c) NSF sponsored workshop on midscale instrumentation for quantum materials participant.
- (d) Quantum Materials: For Design-By-Design workshop participant.
- (e) BES QIS Program Framework Discussion” participant
- (5) NSF Quantum Triplets Advisory Board member

(6) Promoting diversity

- (a) Led the Power Hour at the Conductivity and Magnetism in Molecular Materials Gordon Research Conference. **2018**
- (b) Will co-lead Power Hour at the Solid-State Gordon Research Conference **2022**
- (c) Virtual booth at NOBCCChE **2020**

(7) Collaborated with the Museum of Science and Industry to create an exhibit on magnetism, including a video describing magnetic anisotropy. This exhibit moved to O’Hare International Airport for several years and now is housed at the Chicago Public Library