Danna Erit Freedman
Northwestern University
Department of Chemistry
Phone: (847) 491-4441
danna.freedman@northwestern.edu
http://sites.northwestern.edu/freedman

Appointments

Associate Professor, Department of Chemistry, Northwestern University	**Sept 1, 2018-**
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 *Advisor: Prof. Daniel G. Nocera* **2012**
Ph.D. Inorganic Chemistry, University from California, Berkeley, *Advisor: Prof. Jeffrey R. Long* **2009**
Thesis title: Increasing Anisotropy in Single-Molecule Magnets
A. B. Chemistry *cum laude* Harvard University *Advisor: Prof. Hongkun Park* **2003**

Awards and Honors

Kavli Fellow	**2018**
Camille Dreyfus Teacher-Scholar Award	**2018-2023**
Presidential Early Career Award for Scientists and Engineers (PECASE) via DoD (AFOSR)	**2017-2022**
NSF CAREER Award	**2015-2020**
Searle Teaching Fellow	**2014-2015**
A. P. Sloan Research Fellow	**2015-2017**
Camille and Henry Dreyfus Environmental Mentor	**2016**
Air Force Office of Scientific Research Young Investigator Program	**2014-2017**
Initiative for Sustainability and Energy at Northwestern Booster Award	**2012-2013**
NSF-American Competitiveness in Chemistry Fellowship	**2010-2012**
Tyco Electronics Graduate Fellowship	**2008-2009**
France-Berkeley Fund Fellowship	**2007**

Publications

Independent Career

(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. *Angew. Chem. Int. Ed*. **2018**. *Early View*

(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** *ASAP* DOI: 10.1021/jacs.8b05601.

(40) Pearson, T. J.; Laorenza, D.; Krzyaniak, M.; Wasielewski M. R.; Freedman, D. E. Octacyanometallate Qubit Candidates *Dalton Trans.* **2018** Advance Article. *In honor of Kim Dunbar's 60th birthday.*

(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) Coste, S. C.; Vlaisavljevich, B.; Freedman, D. E. Magnetic Anisotropy from Main Group Elements: Halide versus Group 14 Elements *Inorg. Chem.* **2017**, *56,* 8195–8202.

(36) 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.

(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.

(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.

(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.

(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 $FeBi_2$ *ACS Central Science* **2016**, *2*, 867–871.

(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 $[Co(C_3S_5)_2]^{2-}$ from a Molecular Magnet to a Potential Qubit *Chem. Sci.* **2016**, *7*, 6160–6166.

(24) Fataftah, M. S.; Zadrozny, J. M.; Coste, S. C.; Graham, M. J.; Rogers, D. M.; Freedman, D. E. Attainment of Two Qubits in the Ground State Spin Manifold of a Molecule; *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 Central Science* **2015***, 1,* 488–492.

(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. $(BiSe)_{1.23}CrSe_2$ and $(BiSe)_{1.22}(Cr_{1.2}Se_2)_2$: 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.

(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 Cu(1,3-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 $ZnCu_3(OH)_6Cl_2$ 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 $BaNi_3(OH)_2(VO_4)_2$ *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. $CdCu_3(OH)_6Cl_2$: 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, $ZnCu_3(OH)_6Cl_2$ *J. Am. Chem. Soc.* **2010** 132 (45), 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 $[Re(CN)_7]^{4-/3-}$ *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: $Mg_xCu_{4-x}(OH)_6Cl_2$ *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 Coupling in Two Molecules Incorporating $[Cr(CN)_6]^{3-}$ and $[Mo(CN)_6]^{3-}$ *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 $[Re(CN)_7]^{3-}$ *J. Am. Chem. Soc.* **2008**, *130*, 2884–2885.

(2) Freedman, D. E.; Bennett, M. V.; Long, J. R. Symmetry-Breaking Substitutions of $[Re(CN)_8]^{3-}$ into the Centered, Face-Capped Octahedral Clusters $(CH_3OH)_{24}M_9M'_6(CN)_{48}$ (M = Mn, Co; M' = Mo, 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 *(contributed lectures available upon request)*

(73) *Solid State GRC,* New London, NH — July, **2018**

(72) *Miller Institute Symposium,* Marshall, CA — June, **2018**

(71) *51st Annual International Meeting of the EPR spectroscopy group of the Royal Society of Chemistry,* London, UK — April, **2018**

(70)	*ACS National Meeting: ACS Award in Pure Chemistry: Symposium in Honor of Mircea Dinca*	March, **2018**
(69)	*ACS National Meeting: Cold Molecules for Chemistry*	March, **2018**
(68)	*Texas A & M* College Station, TX	March, **2018**
(67)	*Kavli Frontiers of Science Symposium* Irvine, CA	February, **2018**
(66)	*University of Washington,* Seattle, WA	February, **2018**
(65)	*Physics and Chemistry of Surfaces and Interfaces* Kona, HI	January, **2018**
(64)	*Iowa State,* Ames IA	December, **2017**
(63)	*North Carolina State University* Raleigh, NC	September, **2017**
(62)	*Exploring quantum phenomena and quantum matter in ultrahigh magnetic fields: NSF Workshop* Alexandria, VA	September, **2017**
(61)	*ACS National Meeting: Personal and Global Energy Conversion in Chemistry and Biology Symposium*, Washington, DC	August, **2017**
(60)	*North American Solid State Chemistry Conference*, Santa Barbara, CA	August, **2017**
(59)	*Quantum Summer School*, Johns Hopkins University	June, **2017**
(58)	*Canadian Society of Chemistry, Metal and Covalent Organic Frameworks* Toronto, Canada	May, **2017**
(57)	*University of California, Irvine,* Irvine, CA	May, **2017**
(56)	*University of California, Los Angeles,* Los Angeles, CA	May, **2017**
(55)	*University of California, Santa Barbara* Santa Barbara, CA	May, **2017**
(54)	*University of Pittsburgh,* Pittsburgh, PA	April, **2017**
(53)	*ISACS: Challenges In Inorganic Chemistry, Plenary Speaker*, Manchester UK	April, **2017**
(52)	*ACS National Meeting: Celebrating 60 Years of the Division of Inorganic Chemistry*, San Francisco, CA	April, **2017**
(51)	*Caltech* Pasadena, CA	March, **2017**
(50)	*Michigan State University* East Lansing, MI	March, **2017**
(49)	*Massachusetts Institute of Technology* Cambridge, MA	March, **2017**
(48)	*Florida State University* Tallahassee FL	February, **2017**
(47)	*University of Florida, Gainesville, FL*	February, **2017**
(46)	*Harvard University,* Cambridge, MA	February, **2017**
(45)	*Columbia University,* New York, NY	February, **2017**
(44)	*University of California, Berkeley* Berkeley, CA	February, **2017**
(43)	*Stanford University,* Stanford, CA	February, **2017**
(42)	*Pennsylvania State University,* State College, PA	November, **2016**
(41)	*Colorado State University* Fort Collins, CO	October, **2016**
(40)	*International Meeting on Spins in Organic Semiconductors,* Chicago, IL	October, **2016**
(39)	*University of Pennsylvania* Philadelphia, PA	September, **2016**
(38)	*Osaka City University International Conference* Osaka, Japan	September, **2016**
(37)	*Conductivity & Magnetism in Molecular Materials Gordon Research Conference*, Biddeford, ME	August, **2016**
(36)	*Inorganic Gordon Research Conference*, Biddeford, ME	June, **2016**
(35)	*Rensselaer Polytechnic Institute Student Invited Seminar* Troy, NY	May, **2016**
(34)	*ACS National Meeting: ACS Award in Inorganic Chemistry: Symposium in honor of Mercouri G. Kanatzidis,* San Diego, CA	March, **2016**
(33)	*University of California, San Diego,* San Diego, CA	January, **2016**
(32)	*Pacifichem*, Bismuth Symposium, Honolulu, HI	December, **2015**
(31)	*European Materials Research Science Conference*, Warsaw, Poland	September, **2015**
(30)	*Indiana University,* Bloomington, IN	September, **2015**
(29)	*ACS National Meeting* Synthetic Chemistry Approaches to Magnetic Materials Symposium, Boston, MA	August, **2015**

(28)	*Zero-field Spin Effects in Chemical Systems*, Telluride, CO	June, **2015**
(27)	*Awaji International Workshop on Electron Spin Science & Technology: Biological and Materials Science Oriented Applications*, Awaji, Japan	June, **2015**
(26)	*North America-Greece-Cyprus Workshop on Paramagnetic Materials*, Athens Greece	June, **2015**
(25)	*ACS National Meeting*, ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry in Honor of Kim R. Dunbar - Denver, CO,	March, **2015**
(24)	*Quantum Technology,* Manchester, England	January, **2015**
(23)	Institute for Molecular Engineering University of Chicago	November, **2014**
(22)	*ACS National Meeting*, Inorganic Chemistry Lectureship Award: Symposium in Honor of Jeffrey R. Long *San Francisco, CA*	August, **2014**
(21)	*ACS National Meeting* ExxonMobil Solid State Chemistry Faculty Fellow Award: Symposium in Honor of Daniel Fredrickson, *San Francisco, CA*	August, **2014**
(20)	*International Conference on Molecule-Based Magnets*, St. Petersburg, Russia	July, **2014**
(19)	*Inorganic Gordon Research Conference*, Biddeford, ME	June, **2014**
(18)	*University of Illinois, Champaign Urbana*, Department of Physics	April, **2014**
(17)	*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	March, **2014**
(16)	*Missouri University of Science and Technology*, Rolla, MO	October, **2013**
(15)	*National High Magnetic Field Laboratory*, Tallahassee, Fl	August, **2013**
(14)	*Argonne National Laboratory*, Argonne, IL	July, **2013**
(13)	*UC Santa Barbara*, Santa Barbara, CA	January, **2012**
(12)	*UC Irvine*, Irvine, CA	January, **2012**
(11)	*University of Chicago,* Chicago, IL	January, **2012**
(10)	*Princeton University*, Princeton NJ	January, **2012**
(9)	*Northwestern University*, Evanston, IL	December, **2011**
(8)	*University of Minnesota*, Minneapolis, MN	December, **2011**
(7)	*Harvard University*, Cambridge, MA	December, **2011**
(6)	*Oregon State University*, Corvalis, OR	December, **2011**
(5)	*Stanford University*, Stanford CA	December, **2011**
(4)	*Rutgers University*, New Brunswick NJ	November**, 2011**
(3)	*UC Berkeley,* Berkeley, CA	May, **2011**
(2)	*Bruker-MIT Symposium,* Cambridge, MA	February, **2010**
(1)	*Centre Recherche de Paul Pascal University of Bordeaux,* Bordeaux, France	February**, 2008**

University Service

(1) Department of Chemistry IMSERC Committee **2012**- present
(2) Department of Chemistry Graduate Admission and Recruiting Committee **2012**- present
(3) Department of Chemistry Junior Faculty Search Committee, **2014**, **2016**
(4) Department of Chemistry General Chemistry Curriculum Revision Committee **2014- present**
(5) Provost's Advisory Council on Women Faculty **2016**- present
(6) Undergraduate Research Grant Committee **2016-2017**

Professional Activities

(1) Reviewer; selected journals: *Nature Chemistry*, *Nature Communications*, *Journal of the American Chemical Society, Inorganic Chemistry, Journal of*

Materials Chemistry, Chemical Science, Physical Review B, Chemical Communications and Dalton Transactions (over 100 papers reviewed)	**2010 - present**
(2) Reviewer: selected funding agencies: ARO, AFOSR, NSF, DOE	**2012 - present**
(2) NSF sponsored workshop on midscale instrumentation for quantum materials participant	**2016**
(3) Quantum Materials: For Design-By-Design workshop participant	**2016**
(4) NSF Quantum Information for Chemistry workshop report co-author	**2016 - 2017**
(5) Quantum triplets advisory board member	**2017 - present**
(6) Co-creator Museum of Science and Industry/O'Hare Magnetism Exhibit	**2014 - present**
(7) Fellow Northwestern Public Affairs Residential College	**2013 - present**

Teaching

Professor: General Chemistry, Chem 103	**2013 - present**
Professor: Graduate Inorganic Chemistry, Chem 434	**2014 - present**
Outreach Organizer: CMSE outreach for middle schools	**2010-2012**
Guest Lecturer: Inorganic Chemistry, (graduate level)	**2010**
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**