

VITA

Stephen M. Holmes

Current Position: Associate Professor

Business: Department of Chemistry & Biochemistry
University of Missouri-St. Louis
St. Louis, MO 63121
Voice: (314) 516-4382
E-Mail: holmesst@umsl.edu
FAX: (314) 516-5342

Education

B.S., Southwest Texas State University (now Texas State University), 1992
Ph.D., University of Illinois at Urbana-Champaign, 1999
Dissertation: "Molecule-Based Magnets Constructed from Hexacyanometalates,"
(G. S. Girolami)

Professional Experience

Undergraduate Research Assistant, Southwest Texas State University, 12/89-5/92
Research Assistant, State University of New York at Stony Brook, 6/91-8/91
Research Assistant, EXXON Research and Development Laboratories, Baton Rouge,
LA, 5/92-8/92
Graduate Research Assistant, University of Illinois at Urbana-Champaign, 11/92-5/99
Postdoctoral Research Associate, Cornell University, 7/99-6/01
Assistant Professor, University of Kentucky, 2001-2008
Associate Professor, University of Missouri-St. Louis, 2008-present

Current Research Interests

Synthetic Inorganic Chemistry
Molecule-Based Magnetic Clusters and Networks
Light-Responsive Materials
Materials Chemistry/Molecule-Based Devices

Professional Activities

American Chemical Society
Inorganic Division, American Chemical Society

Honors

Dow Chemical Scholar, [Southwest Texas State University, (Recently Changed Name
To: Texas State University)], 1991-92

Outstanding Chemistry Student, American Institute of Chemists, [Southwest Texas State University, (Recently Changed Name To: Texas State University)], 1992

Inorganic Chemistry Top-20 Most Cited Paper in 2005 (1 paper: #6 of 20)

http://pubs.acs.org/journals/inocaj/promo/most/most_cited/2005.html

Inorganic Chemistry Top-20 Most Cited Paper in 2006 (3 papers: #2, 6, and 17 of 20)

http://pubs.acs.org/journals/inocaj/promo/most/most_cited/2006.html

National Science Foundation CAREER Award (2007-2112)

Research Publications

(Prior to 2001)

1. E. Kime-Hunt, K. Spartalian, S. Holmes, M. Mohan and C. J. Carrano, "Vanadium Metabolism in Tunicates: The Coordination Chemistry of V(III), V(IV), and V(V) with Models for the Tunichromes," *J. Inorg. Biochem.*, **41**, 125-141 (1991).
[http://dx.doi.org/10.1016/0162-0134\(91\)80006-4](http://dx.doi.org/10.1016/0162-0134(91)80006-4)
2. S. M. Holmes and C. J. Carrano, "Models for the Binding Site in Bromoperoxidase: Mononuclear Vanadium(V) Phenolate Complexes of the Hydridotris(3,5-dimethylpyrazolyl)-borate Ligand," *Inorg. Chem.*, **30**, 1231-1235 (1991).
<http://dx.doi.org/10.1021/ic00006a014>
3. M. Mohan, S. M. Holmes, R. J. Butcher, J. P. Jasinski and C. J. Carrano, "Synthesis, Structure, and Spectroscopic Properties of Vanadium(III) and -(IV) Complexes Containing Hydridotris(pyrazolyl)borate Ligands. 3," *Inorg. Chem.*, **31**, 2029-2034 (1992).
<http://dx.doi.org/10.1021/ic00037a010>
4. A. Mayr, S. M. Holmes and C. M. Bastos, "Preference of Carbonyl Ligands Over Isocyanide Ligands in Nucleophile-Induced Coupling with Alkylidyne Ligands," *Organometallics*, **11**, 4358-4362 (1992). <http://dx.doi.org/10.1021/om00060a067>
5. C. J. Carrano, M. Mohan, S. M. Holmes, R. de la Rosa, A. Butler, J. M. Charnock and C. D. Garner, "Oxovanadium(V) Alkoxo-Chloro Complexes of the Hydridotripyrazolylborates as Models for the Binding Site in Bromoperoxidase," *Inorg. Chem.*, **33**, 646-655 (1994). <http://dx.doi.org/10.1021/ic00082a007>
6. B. R. Cook, B. B. Wilkinson, C. C. Culross, S. M. Holmes and L. E. Martinez, "Hydrogen Transfer Induced Cleavage of Biaryl Bonds," *Energy Fuels*, **11**, 61-75 (1997).
<http://dx.doi.org/10.1021/ef9600669>
7. S. M. Holmes and G. S. Girolami, "New Prussian Blue Analogues Constructed from the $[\text{Cr}(\text{CN})_5\text{NO}^{3-}]$ and $[\text{Cr}(\text{CN})_6^{4-}]$ Anions. A Building Block Approach to High T_N Ferrimagnets," *Mol. Cryst. Liq. Cryst.*, **305**, 279-290 (1997).
8. K. Awaga, T. Sekine, M. Okawa, W. Fujita, S. M. Holmes and S. G. Girolami, "High-Pressure Effects on a Manganese Hexacyanomanganate Ferrimagnet with $T_N = 29 \text{ K}$," *Chem. Phys. Lett.*, **293**, 352-356 (1998). [http://dx.doi.org/10.1016/S0009-2614\(98\)00799-4](http://dx.doi.org/10.1016/S0009-2614(98)00799-4)

9. S. M. Holmes and S. G. Girolami, "Sol-Gel Synthesis of $KV^{II}[Cr^{III}(CN)_6] \cdot 2H_2O$: A Crystalline Molecule-Based Magnet with a Magnetic Ordering Temperature Above 100 °C," *J. Am. Chem. Soc.*, **121**, 5593-5594 (1999). <http://dx.doi.org/10.1021/ja990946c>
10. S. M. Holmes, D. F. Schafer II, P. T. Wolczanski and E. B. Lobkovsky, "Synthesis of $(tBu_3SiNH)_2ClW \equiv WCl(NHSi^tBu_3)_2$ and Its Degradation via NH Bond Activation," *J. Am. Chem. Soc.*, **123**, 10571-10583 (2001). <http://dx.doi.org/10.1021/ja010957h>

(2001 to Present)

11. S. M. Holmes, S. G. McKinley, G. S. Girolami, "Transition Metal *p*-Toluenesulfonates," *Inorg. Synth.*, **33**, 91-103 (2002).
12. J. R. Withers, C. Ruschmann, P. Bojang, S. Parkin and S. M. Holmes, "Synthesis and Structural Characterization of Bi- and Trimetallic Octacyanometalate(IV) Complexes: $[\Delta, \Delta-M^{II}(en)_3][cis-M^{II}(en)_2(OH)_2][M^{IV}(CN)_8] \cdot 2H_2O$ and $[cis-M^{II}(en)_2(OH)_2]_2[(\Delta-NC)_2M^{IV}(CN)_6] \cdot 4H_2O$ ($M^{II} = Mn, Co, Ni$; $M^{IV} = Mo, W$)," *Inorg. Chem.*, **44**, 352-358 (2005). <http://dx.doi.org/10.1021/ic048936m>
13. J. R. Withers, C. Ruschmann, S. Parkin and S. M. Holmes, "One- and Three-Dimensional Octacyanometalate(IV) Networks Constructed via a Building Block Approach: $\{[trans-Ni^{II}(tn)_2(OH)_2][trans-Ni^{II}(\mu-NC)_2(tn)_2][(\mu-NC)_3M^{IV}(CN)_5] \cdot 6H_2O\}$ ($M^{IV} = Mo, W$) and $Cs_4[Cu^{II}(OH_2)_4]_2[Cu^{II}(NH_3)]_4[Mo^{IV}(CN)_8]_4 \cdot 2H_2O$," *Polyhedron*, **24**, 1845-1854 (2005). <http://dx.doi.org/10.1016/j.poly.2005.06.052>
14. D. Li, S. Parkin, G. Wang, G. T. Yee, A. V. Prosvirin and S. M. Holmes, "Single Molecule Magnets Constructed from Cyanometalates: $\{[Tp^*Fe^{III}(CN)_3M^{II}(DMF)_4]_2[OTf]_2\} \cdot 2DMF$ ($M^{II} = Co, Ni$)," *Inorg. Chem.*, **44**, 4903-4905 (2005). <http://dx.doi.org/10.1021/ic048367i>
15. D. Li, S. Parkin, G. Wang, G. T. Yee and S. M. Holmes, "Synthesis and Spectroscopic and Magnetic Characterization of Tris(3,5-dimethylpyrazol-1-yl)borate Iron Tricyanide Building Blocks, a Cluster, and a One-Dimensional Chain of Squares," *Inorg. Chem.*, **45**, 1951-1959 (2006). <http://dx.doi.org/10.1021/ic051044h>
16. D. Li, S. Parkin, G. Wang, G. T. Yee and S. M. Holmes, "Early Metal Di- and Tricyanovanadates: Useful Building Blocks for Constructing Magnetic Clusters," *Inorg. Chem.*, **45**, 2773-2775 (2006). <http://dx.doi.org/10.1021/ic051630a>
17. D. Li, S. Parkin, G. Wang, G. T. Yee, R. Clérac, W. Wernsdorfer and S. M. Holmes, "An $S = 6$ Cyano-Bridged Octanuclear $Fe^{III}_4Ni^{II}_4$ Complex that Exhibits Slow Relaxation of the Magnetization," *J. Am. Chem. Soc.*, **128**, 4214-4215 (2006). <http://dx.doi.org/10.1021/ja058626i>
18. D. Li, R. Clérac, S. Parkin, G. Wang, G. T. Yee and S. M. Holmes, "An $S = 2$ Cyanide-Bridged Trinuclear $Fe^{III}_2Ni^{II}$ Single-Molecule Magnet," *Inorg. Chem.*, **45**, 5251-5253 (2006). DOI: <http://dx.doi.org/10.1021/ic060379b>
19. J. R. Withers, D. Li, J. Triplett, C. Ruschmann, S. Parkin, G. Wang, G. T. Yee and S. M. Holmes, "A Two-Dimensional Octacyanomolybdate(V)-Based Ferrimagnet: $\{[Mn^{II}(DMF)_4]_3[Mo^V(CN)_8]_2\}_n$," *Inorg. Chem.*, **45**, 4307-4309 (2006). DOI: <http://dx.doi.org/10.1021/ic0515251>

20. D. Li, S. Parkin, R. Clérac and S. M. Holmes, "Ancillary Ligand Functionalization of Cyanide-Bridged $S = 6$ $\text{Fe}^{\text{III}}_4\text{Ni}^{\text{II}}_4$ Complexes for Molecule-Based Electronics," *Inorg. Chem.*, **45**, 7569-7571 (2006). <http://dx.doi.org/10.1021/ic060695q>
21. D. Li, C. Ruschman, R. Clérac and S. M. Holmes, "Syntheses, Structures, and Magnetic Characterization of Dicyanometalate(II) Building Blocks: $[\text{NEt}_4][(\text{Tp}^*)\text{M}^{\text{II}}(\text{CN})_2]$ [$\text{M}^{\text{II}} = \text{Cr, Co, Ni}$; $\text{Tp}^* = \text{hydridotris}(3,5\text{-dimethylpyrazol-1-yl})\text{borate}$]," *Chem. Commun.*, 4036-4038 (2006). <http://dx.doi.org/10.1039/b608297a>
22. K. Park and S. M. Holmes, "Exchange coupling and contribution of induced orbital angular momentum of low-spin Fe^{3+} ions to magnetic anisotropy in cyanide-bridged Fe_2M_2 molecular magnets: Spin-polarized density-functional calculations," *Phys. Rev. B*, **74**, 224440 (2006). <http://link.aps.org/abstract/PRB/v74/e224440>
23. P. Tyagi, D. Li, S. M. Holmes and B. J. Hinds, "Molecular Electrodes at the Exposed Edge of Metal-Insulator-Metal Trilayer Structures," *J. Am. Chem. Soc.*, **128**, 4929-4938 (2007). <http://dx.doi.org/10.1021/ja065789d>
24. D. Li, S. Parkin, R. Clérac, G. Wang, G. T. Yee and S. M. Holmes, "Structural Distortion and Magnetic Behavior in Cyanide-Bridged $\text{Fe}^{\text{III}}_2\text{Ni}^{\text{II}}_2$ Single-Molecule Magnets," *Eur. J. Inorg. Chem.*, 1341-1346 (2007). <http://dx.doi.org/10.1002/ejic.200600819>
25. J. R. Withers, D. Li, J. Triplett, C. Ruschman, S. Parkin, G. Wang, G. T. Yee and S. M. Holmes, "Syntheses, Structures, and Magnetic Characterization of One- and Two-Dimensional Octacyanometalate(V)-Based Networks: $\{[\text{M}^{\text{II}}(\text{DMF})_4]_3[\text{M}^{\text{V}}(\text{CN})_8]_2\}_n$ ($\text{M}^{\text{II}} = \text{Mn, Fe, Ni}$; $\text{M}^{\text{V}} = \text{Mo, W}$)," *Polyhedron*, **26**, 2353-2366 (2007). <http://dx.doi.org/10.1016/j.poly.2007.01.049>
26. S. M. Holmes, A. S. Whelpley and G. S. Girolami, "Nanocomposite of a Chromium Prussian Blue with TiO_2 . Redox Reactions and the Synthesis of Prussian Blue Molecule-Based Magnets," *Polyhedron*, **26**, 2291-2298 (2007). <http://dx.doi.org/10.1016/j.poly.2006.11.015>
27. Li, D.; Clérac, R.; Roubeau, O.; Harté, E.; Mathonière, C.; Le Bris, R.; Holmes, S. M. "Magnetic and Optical Bistability Driven by Thermally and PhotoInduced Intramolecular Electron Transfer in a Molecular Cobalt-Iron Prussian Blue Analogue," *J. Am. Chem. Soc.* **2008**, *130*, 252-259. <http://dx.doi.org/10.1021/ja0757632>

Papers Presented at Professional Meetings

(Prior to 2001)

"New Molecular Magnetic Materials Constructed from Inorganic Pseudohalides," **S. M. Holmes** and G. S. Girolami, August 20, 1995, 210th National Meeting of the American Chemical Society, Chicago, IL.

"New Prussian Blue Analogs Constructed from the $[\text{Cr}(\text{CN})_5\text{NO}]^{3-}$ Anion," **S. M. Holmes** and G. S. Girolami, March 30 - April 2, 1998, 215th National Meeting of the American Chemical Society, Dallas, TX.

“New Molecular Magnets from Cyanochromate and Cyanovanadate Precursors,” **S. M. Holmes** and G. S. Girolami, March 31, 1998, 215th National Meeting of the American Chemical Society, Dallas, TX.

(2001 to Present)

“Facile Syntheses of Useful Divalent and Trivalent Transition-Metal *p*-Toluenesulfonate Salts,” **S. M. Holmes**, S. G. McKinley and G. S. Girolami, August 27, 1998, 216th National Meeting of the American Chemical Society, Boston, MA.

“Infrared, Structural, and Magnetic Characterization of Octacyanometalate Clusters: $M^{II}[M^{II}(\text{MeOH})_3]_8[M^V(\text{CN})_8]_6 \cdot n\text{MeOH}$ ($M^{II} = \text{Mn, Fe, Co, and Ni}$; $M^V = \text{Mo, W}$),” **S. M. Holmes**, J. R. Withers, J. Triplett and S. Parkin, July 14, 2003, Gordon Research Conference, Salve Regina University, Newport, RI.

“Poly(pyrazolyl)borate Cyanometalates as Building Blocks for Constructing Magnetic Clusters and Networks,” D. Li, S. Parkin, **S. M. Holmes**, G. Wang and G. T. Yee, July 18, 2004, Gordon Research Conference, Salve Regina University, Newport, RI.

“Synthesis and Characterization of 1- and 2-D Magnetic Octacyanometalate(V) Networks: $[M^{II}(\text{DMF})_4]_3[M^V(\text{CN})_8]_2$ ($M^{II} = \text{Mn, Co, Ni}$; $M^V = \text{Mo, W}$),” J. R. Withers, C. Ruschman, J. Triplett, S. Parkin, **S. M. Holmes**, G. Wang and G. T. Yee, July 18, 2004, Gordon Research Conference, Salve Regina University, Newport, RI.

“Clusters and Cluster-Expanded Networks Derived from Tris(pyrazolyl)borate Tricyanide Complexes,” (**Invited Talk**), D. Li, S. Parkin, G. Wang, G. T. Yee and **S. M. Holmes**, March 13-17, 2005, 229th National Meeting of the American Chemical Society, San Diego, CA.

“Synthesis, Stability, Structural, and Magnetic Characterization of High-Nuclearity Octacyanometalate Clusters,” J. R. Withers, J. Triplett, S. Parkin and **S. M. Holmes**, March 13-17, 2005, 229th National Meeting of the American Chemical Society, San Diego, CA.

“Synthesis and Characterization of 1- and 2-D Glassy Octacyanometalate(V) Networks,” J. R. Withers, J. Triplett, C. Ruschman, S. Parkin, G. Wang, G. T. Yee and **S. M. Holmes**, March 13-17, 2005, 229th National Meeting of the American Chemical Society, San Diego, CA.

“Synthesis, Structural, and Magnetic Characterization of Bi- and Trimetallic Octacyanometalate(IV) Clusters,” J. R. Withers, C. Ruschman, P. Bojang, S. Parkin and **S. M. Holmes**, March 13-17, 2005, 229th National Meeting of the American Chemical Society, San Diego, CA.

“Single-Molecule Magnets Constructed from Cyanometalates: $\{[\text{Tp}^*\text{Fe}^{III}(\text{CN})_3\text{-}M^{II}(\text{DMF})_4]_2[\text{OTF}]_2\} \cdot 2\text{DMF}$ ($M^{II} = \text{Co, Ni}$),” D. Li, S. Parkin, G. Wang, G. T. Yee, A. Prosvirin and **S. M. Holmes**, July 18, 2005, Gordon Research Conference, Newport, RI.

“Poly(pyrazolyl)borate Di- and Tricyanide Complexes and Derived Clusters,” D. Li, M. Tang, C. Ruschman, S. Parkin, G. Wang, G. T. Yee, B. J. Hinds and **S. M. Holmes**, July 18, 2005, Gordon Research Conference, Newport, RI.

“The Role of Structural Anisotropy in Cyanometalate Single-Molecule Magnets,” D. Li, R. Clérac, S. Parkin, G. Wang, G. T. Yee and **S. M. Holmes**, March 25-30, 2006, 231st National Meeting of the American Chemical Society, Atlanta, GA.

“Cyano-Bridged Octanuclear Clusters that Exhibit Slow Relaxation of the Magnetization: Useful Reagents for Constructing Molecule-Based Devices,” D. Li, S. Parkin, G. Wang, G. T. Yee, R. Clérac, W. Wernsdorfer and **S. M. Holmes**, March 25-30, 2006, 231st National Meeting of the American Chemical Society, Atlanta, GA.

“Early Metal Di- and Tricyanometalates: Useful Building Blocks for Constructing Magnetic Clusters,” D. Li, S. Parkin, G. Wang, G. T. Yee and **S. M. Holmes**, March 25-30, 2006, 231st National Meeting of the American Chemical Society, Atlanta, GA.

“Synthesis and Characterization of Anisotropic Cyanometalate Clusters Derived from Poly(pyrazolyl)borate Iron(III) Tricyanides,” D. Li, R. Clérac, S. Parkin, G. Wang, G. T. Yee and **S. M. Holmes**, March 25-30, 2006, 231st National Meeting of the American Chemical Society, Atlanta, GA.

“Engineering Octanuclear Cyanide-Bridged $S = 6$ Complexes for Molecule-Based Electronics,” D. Li, S. Parkin, P. Tyagi, **S. M. Holmes** and B. J. Hinds, June 15-16, 2006 Oak Ridge National Laboratory CNMS Research Conference, Oak Ridge, TN.

“The Role of Structural Anisotropy in Tricyanometalate-Based Single-Molecule Magnets,” D. Li, S. Parkin, R. Clérac, G. Wang, G. T. Yee and **S. M. Holmes**, June 15-16, 2006 Oak Ridge National Laboratory CNMS Research Conference, Oak Ridge, TN.

“Engineering Octanuclear Cyanide-Bridged $S = 6$ Complexes for Molecule-Based Electronics,” (**Invited Talk**), D. Li, S. Parkin, P. Tyagi, **S. M. Holmes** and B. J. Hinds, July 17-18, 2006, Gordon Research Conference, Salve Regina University, Newport, RI.

“The Role of Structural Anisotropy in Tricyanometalate-Based Single-Molecule Magnets,” D. Li, S. Parkin, R. Clérac, G. Wang, G. T. Yee and **S. M. Holmes**, July 19-20, 2006, Gordon Research Conference, Salve Regina University, Newport, RI.

“The Role of Structural Anisotropy in Tricyanometalate-Based Single-Molecule Magnets,” D. Li, S. Parkin, R. Clérac, G. Wang, G. T. Yee and **S. M. Holmes**, August 13-17, 2006, International Conference on Molecular Magnetism, University of Victoria, Victoria, Canada.

“Engineering Octanuclear Cyanide-Bridged $S = 6$ Complexes for Molecule-Based Electronics,” D. Li, S. Parkin, P. Tyagi, **S. M. Holmes** and B. J. Hinds, August 13-17, 2006, International Conference on Molecular Magnetism, University of Victoria, Victoria, Canada.

“Building Block Approaches for Tuning Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” (**Invited Talk**), October 12-15, 2006, 14th National Science Foundation Workshop on Materials Chemistry, St. Louis, MO.

“Building Block Approaches for Tuning Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” (**Invited Talk**), June 4-7, 2007, National Science Foundation Inorganic Chemistry Workshop, Jackson Hole, WY.

“Magnetic and Optical Bistability Driven by Thermally- and Photo-Induced Intramolecular Electron Transfer in a Molecular Cobalt-Iron Prussian Blue Analogue,” D. Li, R. Clérac, O. Roubeau, E. Harté, C. Mathonière, R. Le Bris and S. M. Holmes, July 15-20, 2007, Inorganic Gordon Research Conference, Salve Regina University, RI.

“Synthesis and Characterization of Di- and Trivalent Tris(3,5-Dimethylpyrazolyl)borate Cyanometalate Complexes and a Network Derivative,” M. Tang, D. Li, Y. Zhang, R. Clérac and S. M. Holmes, July 15-20, 2007, Inorganic Gordon Research Conference, Salve Regina University, RI.

“Synthesis and structural and magnetic characterization of di- and trivalent cyanomanganates,” M. Tang, D. Li, Y. Zhang, R. Clérac and S. M. Holmes, August 19-24, 2007, 234th National Meeting of the American Chemical Society, Boston, MA.

“Synthesis and characterization of an octanuclear cyanometalate complex that exhibits thermally- and light-induced intramolecular electron transfer,” D. Li, R. Clérac, O. Roubeau, E. Harté, C. Mathonière, R. Le Bris and S. M. Holmes, August 19-24, 2007, 234th National Meeting of the American Chemical Society, Boston, MA.

“Magnetostructural correlations in trinuclear $\{\text{Fe}^{\text{III}}_2\text{Ni}^{\text{II}}\}$ cyanometalate complexes,” D. Li, R. Clérac and S. M. Holmes, August 19-24, 2007, 234th National Meeting of the American Chemical Society, Boston, MA.

“Synthesis and structural and magnetic characterization of trivalent cyanomanganate $\{\text{M}^{\text{III}}_2\text{M}^{\text{II}}_2\}$ complexes,” M. Tang, D. Li, Y. Zhang, R. Clérac and S. M. Holmes, August 19-24, 2007, 234th National Meeting of the American Chemical Society, Boston, MA.

Current Funding, Grants and Contracts

1. “CAREER: Construction of Magnetic Cyanide-, Acetylide-, and Butadiynylide-Based Clusters,” National Science Foundation, \$555,000, 2/1/07 - 1/31/12.

Previous Funding, Grants and Contracts

1. “Molecule-Based Magnets via a Building Block Approach,” Summer Faculty Research Fellowship, University of Kentucky, \$6,000, 6/1/02 - 8/31/02.
2. “Shared Equipment Maintenance Fund”, University of Kentucky, \$1,800, 6/02.
3. “Molecule-Based Magnets Constructed from Maleonitriledithiolate, Tetrathiooxalate, and Trithiocarbonate Precursors,” Petroleum Research Fund, \$35,000, 9/1/02 - 8/31/05.
4. “Molecule-Based Magnets via a Building Block Approach,” Summer Faculty Research Fellowship, University of Kentucky, \$6,000, 6/1/03 - 8/31/03.
5. “Synthesis of Discrete Molecule-Based Networks for Engineered Molecular Electronics,” A&S Summer Research Fellowship, University of Kentucky, \$4,000, 7/1/04 - 8/31/04.
6. “A Building Block Approach to Construct Molecule-Based Devices,” Kentucky Science and Engineering Foundation, \$14,989, 9/1/04 - 8/31/05.

7. "A Building Block Approach to Construct Cyanometalate Single-Molecule Magnets," Kentucky Science and Engineering Foundation, \$50,000, 9/1/05 - 3/31/07.
8. "Synthesis of Discrete Molecule-Based Clusters for Engineered Electronics and Molecular Electronics," A&S Major Research Project, University of Kentucky, \$10,000, 7/1/05 - 6/30/06.
9. "Synthesis of Discrete Molecule-Based Clusters for Engineered Molecular Electronics," University of Kentucky Research Support Grant, \$20,000, 7/1/05 - 6/30/06.
10. "Rational Approaches to Construct Molecule-Based Magnetic Clusters and Devices," University of Kentucky, \$8,000, 7/1/06 - 8/31/06.
11. "Molecule-Based Magnetic Clusters Constructed from Poly(pyrazolyl)borate Acetylides and Butadiynylide Building Blocks," Kentucky Science and Engineering Foundation, \$100,000, 10/1/06 - 9/30/08.

Committees (University of Missouri-St. Louis)

Department

Long-Range Planning Committee, 2008
X-ray Committee, 2008-present

Committees (University of Kentucky)

Department

Undergraduate Committee, 2001-2005
Nitrogen Use Committee, 2002
Regional Undergraduate Chemistry Poster Competition Committee, 2002
Business Affairs Committee, 2003-2005
Seminar Committee, 2005-2007
Physics Faculty Search Committee, 2007
Information Committee, 2007

Courses Taught (University of Missouri-St. Louis)

CHEM 5494 Spectroscopic Methods in Inorganic Chemistry, Fall 2008
CHEM 3412 Basic Inorganic Chemistry, Spring 2009
CHEM 6487 Problem Seminar in Inorganic Chemistry, Spring 2009

Courses Taught (University of Kentucky)

CHE 105 - General Chemistry I, Spring, 2006, 2007, 2008; Fall 2007
CHE 107 - General Chemistry II, Spring, 2003
CHE 450G - Practical Inorganic Chemistry, Fall, 2005, 2006
CHE 510 - Advanced Inorganic Chemistry, Fall, 2001-2004
CHE 572 - Undergraduate Seminar I, Spring, 2004
CHE 572 - Undergraduate Seminar II, Spring, 2004
CHE 710 - Physical Methods in Inorganic Chemistry, Spring, 2005
CHE 776 - Inorganic Seminar, Spring, 2002, 2004-2006

M.S. Theses Directed

Christopher Liebold, 2004-2006
Minao Tang, 2004-2007

Ph.D. Dissertations Directed

Uma Mallik, 2007-present
Jeffrey R. Withers, 2008-present

Undergraduate Research Directed

Jeremy Triplett, Spring 2002-03, (B.S., Chemistry, University of Kentucky;
Kentucky State Crime Laboratory)
Christopher Stieha, Spring 2002-Fall 2002, (B.A., Chemistry, University of
Kentucky)
Pasano Bojang, Summer 2002, (NSF REU student; B.S., Kentucky State
University)
James Robinson, Summer 2002, (enrolled at University of Kentucky)
Alisha M. O'Connell, Summer 2002-Fall 2002, (B.S., Chemistry, University of
Kentucky)
Chad Ruschman, Summer 2003-2007, (B.S., Chemistry, University of Kentucky;
University of Georgia graduate student)
Grant McCullar, Spring 2004 (enrolled at University of Kentucky)
Kristin Frohmmeyer, Spring 2005 (enrolled at University of Kentucky)
Josh Owen, Summer 2005 (Ph.D. Candidate, University of Kentucky)
Stephanie Schummacher, Summer 2006 (enrolled at Northern Kentucky
University)

Postdoctoral and Visiting Scholars Directed

Dongfeng Li, Summer 2003-2006, (Nanjing University, China)
Yuanzhu Zhang, Summer 2007-present (Peking University, China)
Amshumali Mungalimane, Summer 2008-present (University of Chile, Chile)

Graduate Advisory Committees (University of Missouri-St. Louis)

Students Currently in Degree Programs

Uma Mallik (Chair, Ph.D.)
Jeffrey R. Withers (Chair, Ph.D.)

Graduate Advisory Committees (University of Kentucky)

Students Who Have Completed Degree Programs

Chad Snyder (Ph.D., 2005)
Laura Land (Ph.D., 2005)
Venkat Koganti (Ph.D.)
Christopher Liebold (Chair, M.S.)
Donghua Zhu (Ph.D.)
Minao Tang (Chair, M.S.)
Serhiy Leontsev (Ph.D.)
Xiunu Lin (Ph.D.)

Community Activities

Bluegrass Astronomy Club, Public Telescope Viewing, September 2002,
Lexington, KY,

Public Telescope Viewing, Danville, KY, September 2004
 HBCU-UP presentation and recruitment, Baltimore, MD, November 2004
 Judge, Regional Undergraduate Poster Competition, Spring 2004, University of Kentucky.
 Regional Judge, Fayette County Science Fair, January 2005
 Public Telescope Viewing, Danville, KY, May 2005
 Public Telescope Viewing, Danville, KY, June 2005
 Public Telescope Viewing, Danville, KY, July 2005
 Public Telescope Viewing, Danville, KY, August 2005
 Head Judge, Regional Science Fair, Spring 2006, University of Kentucky.
 Public Telescope Viewing, Danville, KY, May 2006
 Science Fair Judge, Southern Elementary (Lexington), January 2007
 Public Telescope Viewing, Danville, KY, July 2007
 Session Chair, August 19-24, 2007, 234th National Meeting of the American Chemical Society, Boston, MA.
 Public Telescope Viewing, St. Louis, MO, July 2008
 Public Telescope Viewing, St. Louis, MO, August 2008

Miscellaneous

Seminar to CHE 772, October, 2001, (“Molecule-Based Materials from Inorganic Precursors”), University of Kentucky.

Seminar to CHE 772, November, 13, 2002, (“Molecule-Based Materials from Inorganic Precursors”), University of Kentucky.

Seminar to CHE 772, October 21, 2003, (“A Building-Block Approach to Inorganic Materials”), University of Kentucky.

Seminar to Visiting Ballard High School Students, October 31, 2003, (“A Building-Block Approach to Inorganic Materials”)

Poster, Ohio Inorganic Weekend, November 2003, (“Infrared, Structural, and Magnetic Characterization of Octacyanometalate Clusters: $M^{II}[M^{II}(\text{MeOH})_3]_8[M^V(\text{CN})_8]_6 \cdot n\text{MeOH}$ ($M^{II} = \text{Mn, Fe, Co, Ni}$; $M^V = \text{Mo, W}$)”)

Poster, Ohio Inorganic Weekend, November 2003, (“Synthesis and Characterization of Octacyanometalate Networks: $[M^{II}(\text{DMF})_4]_3[M^V(\text{CN})_8]_2$ ($M^{II} = \text{Mn, Co, Ni}$; $M^V = \text{Mo, W}$)”)

Poster, Naff Symposium, April 2004, (“Infrared, Structural, and Magnetic Characterization of Octacyanometalate Clusters: $M^{II}[M^{II}(\text{MeOH})_3]_8[M^V(\text{CN})_8]_6 \cdot n\text{MeOH}$ ($M^{II} = \text{Mn, Fe, Co, Ni}$; $M^V = \text{Mo, W}$)”), University of Kentucky.

Poster, Naff Symposium, April 2004, (“Synthesis and Characterization of Octacyanometalate Networks: $[M^{II}(\text{DMF})_4]_3[M^V(\text{CN})_8]_2$ ($M^{II} = \text{Mn, Co, Ni}$; $M^V = \text{Mo, W}$)”), University of Kentucky.

Poster, Naff Symposium, April 2004, (“Poly(pyrazolylborate) Cyanometalate Complexes as Synthons for Discrete Clusters, Networks, and Molecular Electronics Applications”), University of Kentucky.

Poster, International Research Scholars Reception and Poster Session, April 2004, (“Poly(pyrazolylborate) Cyanometalate Complexes as Synthons for Discrete Clusters, Networks, and Molecular Electronics Applications”).

Judge, Regional Undergraduate Poster Competition, Spring 2004, University of Kentucky.

Judge, Regional Science Fair, Spring 2004, University of Kentucky.

Girls in Science, Invited Speaker, Summer 2004, University of Kentucky.

Seminar to CHE 772, September 16, 2004, (“Cyanometalates: Synthons for Rationally Constructing Magnetic Materials and Devices”), University of Kentucky.

Poster, Naff Symposium, April 2005, (“Magnetic Cyanometalate Clusters Derived from Tris(pyrazolyl)borate Tricyanides,” D. Li, C. Ruschman, S. Parkin and S. M. Holmes), University of Kentucky.

Poster, Naff Symposium, April 2005, (“Synthesis and Characterization of 1- and 2-D Octacyanometalate Network,” J. R. Withers, C. Ruschman, S. Parkin and S. M. Holmes), University of Kentucky.

Poster, Naff Symposium, April 2005, (“Synthesis, Structural, and Magnetic Characterization of High-Nuclearity Octacyanometalate Clusters,” J. R. Withers, J. Triplet, S. Parkin and S. M. Holmes), University of Kentucky.

Poster, Naff Symposium, April 2005, (“Synthesis, Structural, and Magnetic Characterization of Bi- and Trimetallic Octacyanometalate(IV) Clusters,” J. R. Withers, C. Ruschman, P. Bojang, S. Parkin and S. M. Holmes), University of Kentucky.

Seminar to CHE 772, September 22, 2005, (“Molecule-Based Clusters and Engineered Devices”), University of Kentucky.

Head Judge, Regional Science Fair, Spring 2006, University of Kentucky.

Presentation to AMSTEMM Program, June 15, 2006, University of Kentucky.

Seminar to Student Affiliates of the American Chemical Society (SAACS), September 19, 2006, (“Holmes Group Research at the University of Kentucky”), University of Kentucky.

Seminar to CHE 772, September 21, 2006, (“Molecule-Based Magnetic, Photomagnetic, and Electronic Devices”), University of Kentucky.

Poster, Ohio Inorganic Weekend, November 17, 2006, (“Engineering Octanuclear Cyanide-Bridged $S = 6$ Complexes for Molecule-Based Electronics,” D. Li, S. Parkin, P. Tyagi, B. J. Hinds and S. M. Holmes), Ohio University.

Poster, Ohio Inorganic Weekend, November 17, 2006, (“The Role of Structural Anisotropy in Tricyanometalate-Based Single-Molecule Magnets,” D. Li, S. Parkin, R. Clérac, G. Wang, G. T. Yee and S. M. Holmes), Ohio University.

Poster, Ohio Inorganic Weekend, November 17, 2006, (“Synthesis and Characterization of One- and Two-Dimensional Octacyanometalate(V) Networks: $\{[trans-M^{II}(DMF)_4]-[cis-M^{II}(DMF)_4]_2[M^V(CN)_8]_2\}_n$ ($M^{II} = Mn, Fe, Ni$; $M^V = Mo, W$),” J. R. Withers, D. Li, J. Triplet, C. Ruschman, S. Parkin, G. Wang, G. T. Yee and S. M. Holmes), Ohio University.

Science Fair Judge, Southern Elementary Science Fair, Spring 2007, Lexington, KY.

Poster, Naff Symposium, April 13, 2007, (“Engineering Octanuclear Cyanide-Bridged $S = 6$ Complexes for Molecule-Based Electronics,” D. Li, S. Parkin, P. Tyagi, S. M. Holmes and B. J. Hinds), University of Kentucky.

Poster, Naff Symposium, April 13, 2007, (“The Role of Structural Anisotropy in Tricyanometalate-Based Single-Molecule Magnets,” D. Li, S. Parkin, R. Clérac, G. Wang, G. T. Yee and S. M. Holmes), University of Kentucky.

Poster, Graduate Recruitment, September 7, 2007, (“Engineering Octanuclear Cyanide-Bridged $S = 6$ Complexes for Molecule-Based Electronics,” D. Li, S. Parkin, P. Tyagi, B. J. Hinds and S. M. Holmes), University of Kentucky.

Poster, Graduate Recruitment, September 7, 2007, (“Magnetic and Optical Bistability Driven by Thermally- and Photo-Induced Intramolecular Electron Transfer in a Molecular Cobalt-Iron Prussian Blue Analogue,” D. Li, R. Clérac, O. Roubeau, E. Harté, C. Mathonière, R. Le Bris and S. M. Holmes), University of Kentucky.

Seminar, to Student Affiliates of the American Chemical Society, October 2, 2007, (“Research Opportunities in the Holmes Group”), University of Kentucky.

Poster, Ohio Inorganic Weekend, October 9-10, 2007, (“Magnetic and Optical Bistability Driven by Thermally- and Photo-Induced Intramolecular Electron Transfer in a Molecular Cobalt-Iron Prussian Blue Analogue,” D. Li, R. Clérac, O. Roubeau, E. Harté, C. Mathonière, R. Le Bris and S. M. Holmes), Miami University.

Invited Seminars

(1990- 2000)

“New Structurally Relevant Bromoperoxidase Model Complexes,” **S. M. Holmes** and C. J. Carrano, April 20, 1990, Texas State Research Symposium, San Marcos, TX.

“Investigations on the Nucleophile-Induced Coupling of Alkylidyne and Isocyanide Ligands,” August 6, 1991, **S. M. Holmes** and A. Mayr, Research Experience for Undergraduates Summer Symposium, Stony Brook, NY.

“Hydrogen Transfer Induced Cleavage of Biaryl Bonds,” **S. M. Holmes**, B. R. Cook and C. C. Culross, August 10, 1992, EXXON ERDL Research Symposium, Baton Rouge, LA.

“Molecule-Based Magnets Constructed from Hexacyanometalates,” August 22, 2000, Cornell University, Ithaca, NY.

(2001-2008)

“Molecule-Based Magnets Constructed from Cyanometalate and Thiolate Precursors,” November 13, 2002, Student Affiliates of the American Chemical Society (SAACS), University of Kentucky, Lexington, KY.

“Molecule-Based Magnets Constructed from Cyanometalate and Thiolate Precursors,” December 13, 2002, Department of Physics (Solid State Division), University of Kentucky, Lexington, KY.

“Molecule-Based Magnets Constructed from Hexacyanometalate Precursors,” February 18, 2003, Department of Chemistry, Berea College, Berea, KY.

“Cyanometalates: Synthons for Rationally Constructing Magnetic Materials,” February 6, 2004, Department of Chemistry, Western Kentucky University, Bowling Green, KY.

“Cyanometalates: Synthons for Rationally Constructing Magnetic Materials,” April 30, 2004, Department of Chemistry, Union University, Jackson, TN.

“Seminar to Girls in Science and Girls in Research Program,” Summer 2005, University of Kentucky, Lexington, KY.

“Constructing Molecule-Based Clusters, Networks, and Devices from Cyanometalate Building Blocks,” September 27, 2005, Department of Physics (Solid State Division), University of Kentucky, Lexington, KY.

“Clusters, Networks, and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” February 13, 2006, Department of Chemistry, University of Louisville, Louisville, KY.

“Clusters, Networks, and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” February 24, 2006, Department of Chemistry, University of Cincinnati, Cincinnati, OH.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 4, 2006, Department of Chemistry, Case Western University, Cleveland, OH.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 5, 2006, Department of Chemistry, University of Akron, Akron, OH.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 6, 2006, Department of Chemistry, Kent State University, Kent, OH.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 12, 2006, Department of Chemistry, University of Windsor, Windsor, Canada.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 13, 2006, Department of Chemistry, Wayne State University, Detroit, MI.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 21, 2006, Department of Chemistry, Virginia Polytechnic and State University, Blacksburg, VA.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” April 28, 2006, Department of Chemistry, University of California at Berkeley, Berkeley, CA.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” September 7, 2006, Department of Chemistry, University of Tennessee, Knoxville, TN.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” September 14, 2006, Department of Chemistry, Clemson University, Clemson, SC.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” October 30, 2006, Department of Chemistry, University of Florida, Gainesville, FL.

“Building Block Approaches for Tuning Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” October 12-15, 2006, 14th National Science Foundation Workshop on Materials Chemistry, St. Louis, MO.

“Clusters and Molecule-Based Devices Derived from Poly(pyrazolyl)borate Cyanometalates,” December 1, 2006, Department of Chemistry, University of Notre Dame, South Bend, IN.

(2007-present)

“Building Block Approaches for Constructing Tunable Magnetic and Photomagnetic Cyanometalate Clusters,” February 27, 2007, Department of Chemistry, University of North Carolina at Chapel Hill, Chapel Hill, NC.

“Building Block Approaches for Tuning Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” June 4-7, 2007, National Science Foundation Inorganic Chemistry Workshop, Jackson Hole, WY.

“Building Block Approaches for Tuning the Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” September 14, 2007, Department of Chemistry, University of Louisville, Louisville, KY.

“Building Block Approaches for Tuning the Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” October 1, 2007, Department of Chemistry, Ohio University, Athens, OH.

“Building Block Approaches for Tuning the Magnetic and Photomagnetic Behavior of Cyanometalate Clusters,” September 1-5, 2008, 2nd Workshop on Current Trends in Nanoscopic and Mesoscopic Magnetism, Delphi, Greece.

“Building Block Approaches for Tuning Magnetic and Optical Bistability,” January 27, 2009, Department of Chemistry, Wake Forest University, Winston-Salem, NC.

“Building Block Approaches for Tuning Magnetic and Optical Bistability,” January 28, 2009, Department of Chemistry, Clemson University, Clemson, SC.

“Building Block Approaches for Tuning Magnetic and Optical Bistability,” January 30, 2009, Department of Chemistry, North Carolina State University, Raleigh, NC.

“Building Block Approaches for Tuning Magnetic and Optical Bistability,” April 9, 2009, Department of Chemistry, Florida State University, Tallahassee, FL.

“Building Block Approaches for Tuning Magnetic and Optical Bistability,” April 23, 2009, Department of Chemistry, Washington University, St. Louis, MO.

Research Collaborators

Professor Gordon T. Yee, Virginia Polytechnic and State University, Magnetic Measurements

Professor Bruce J. Hinds, University of Kentucky, Device Fabrication and Characterization

Professor Bruce Alphenaar, University of Louisville, Device Assembly and Characterization

Dr. Sean Parkin, University of Kentucky, X-Ray Studies

Professor Corine Mathóniere, University of Bordeaux, France, Photomagnetism and Reflectivity Measurements

Professor Kyungwha Park, Virginia Polytechnic and State University, DFT Studies of Single-Molecule Magnets

Professor Rodolphe Clérac, Centre de Recherche Paul Pascal, France, Magnetic and Photomagnetic Measurements

Professor Wolfgang Wernsdorfer, CNRS Grenoble, France, μ -SQUID Magnetic Measurements

Professor Rama Balasubramanian, Roanoke College, Mössbauer Measurements

Dr. Franz Renz, Institut für Anorganische Chemie und Analytische Chemie, Johannes Gutenberg-Universität Mainz, Mössbauer Measurements

Professor Barbara Sieklucka, Jagiellonian University, Kraków, Poland, Octacyano-metalate Materials Characterization

Professor Paul S. Weiss, The Pennsylvania State University, Transport, STM and AFM measurements

Professor Eugenio Coronado, Instituto de Ciencia Molecular (ICMol), Department
Química Inorgánica, magnetic and optical studies

Professor Janice Musfeldt, University of Tennessee, Spectroscopic Studies of
Magnetic and Photoresponsive Materials

Professor Mike Whangbo, North Carolina State University, DFT Studies of
Magnetic Materials

Professor Piero Zanello, University of Siena, electrochemical studies of clusters