

# XIAOTANG WANG

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## Work Address:

Department of Chemistry and Biochemistry  
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## EDUCATION

Ph.D., Bioinorganic Chemistry, University of Iowa, Iowa City, Iowa, December 1994.

Dissertation title: *Multinuclear Magnetic Resonance Spectroscopy of Heme Peroxidases and Their Reactions with Substrates.*

M.S., Agroenvironmental Chemistry, Nanjing Institute of Soil Sciences, Academia Sinica, Nanjing, People's Republic of China, January 1985.

Dissertation title: *Effects of Soil Acidification on the Distribution and Chemical Forms of Heavy Metals in Soil Environment.*

B.S., Chemistry, Shaanxi Normal University, Xi'an, P. R. of China, January 1982.

## PROFESSIONAL EXPERIENCE

- 2005- Associate Professor, Department of Chemistry and Biochemistry, Florida International University, Miami, FL 33199
- 2003 – 2004 Associate Professor, Department of Chemistry, Jackson State University, Jackson, Mississippi 39217
- 1999 – 2003 Assistant Professor, Department of Chemistry, Jackson State University, Jackson, Mississippi 39217
- 1996 – 1999 Postdoctoral Fellow/Research Scientist, Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801
- 1995 – 1996 Postdoctoral Associate, Department of Biochemistry, Louisiana State University, Baton Rouge, Louisiana 70803

## RESEARCH INTERESTS

Development of novel therapeutics for cancers and neurodegenerative disorders.  
Enzymatic synthesis of chiral synthons for synthetic, industrial, and medicinal chemistry.  
Biomimetic and NMR spectroscopic study of the active site structure of metalloproteins.  
Biological oxidation and activation of small organic and inorganic molecules.

## HONORS AND ACTIVITIES

National Science Foundation CAREER Award 2004-2010  
Consultant, KOS Pharmaceutical Company, Inc. 2006-2008  
Consultant, Mississippi Chemical Company, Inc. 2000-2003  
Outstanding Teaching Assistant, University of Iowa, 1992-1993.  
Tuition Scholarship, University of Iowa, 1990-1991.

Coordinator, Chinese Students and Scholars Union, Univ. of Illinois, 1997-1998.

## **GRANT SUPPORT**

1. Office of Naval Research (with Drs. Eric. Noe, Hongtao, and Jeffrey Zubkowski), Project Number N00014-91-J-1627, Amount requested, \$100,000. Amount received, \$85,000. 06/01/2000 - 05/31/2001.  
Title: Probing the structure-activity relationship of biological macromolecules through high-resolution nuclear magnetic resonance spectroscopy.
2. National Institute of Health (SCORE), Requested direct cost, \$356,780. Amount received, \$356,780.  
01/01/2003-12/31/2005.  
Title: The Chemical Nature of Prion Peptide-Copper Complexes.
3. National Institute of Health (RCMI), Direct cost requested, \$663,570. Amount received, \$663,570.  
Duration: 07/01/2003 – 06/30/2008, rejected due to job change.  
Title: Characterization of Prion Protein-Copper Complexes.
4. National Institute of Health (RCMI), Direct cost requested, \$531,484. Amount received, \$531,484.  
Duration: 07/01/2003 – 06/30/2008, stays with original institution.  
Title: The Molecular Magnetic Resonance (MMR) Core Facility.
5. National Science Foundation (Career Award), Support requested: \$645,415. Amount received, \$525,000  
Duration: 06/01/2004-05/31/2010.  
Title: Structural Basis for the Chloroperoxidase-Catalyzed Enantioselective Transformations.
6. National Institute of Health (SCORE), Requested direct cost, \$313,959.  
Duration: 04/01/2006-03/31/2008.  
Title: Characterization of Prion Proteins and Their Copper Complexes.
7. Ministry of Science and Technology, support requested: \$120,000. Amount received: \$80,400  
Duration: 08/01/2014-07/31/2017.  
Title: Antiprion Effects and the Molecular Mechanism of Wogonin, Baicalein and their Derivatives

## **COURSES TAUGHT**

General Chemistry  
Inorganic Chemistry  
Biochemistry (for Undergraduates)  
Advanced Inorganic Chemistry

Biochemistry (for Graduates)  
General Chemistry Laboratory  
Seminar  
Bioinorganic Chemistry  
Inorganic Chemistry Laboratory  
Biochemistry Laboratory

### **GRADUATE COMMITTEES**

Served on more than 40 Ph.D. students' dissertation committees.

### **POST DOCTORAL ASSOCIATES SUPERVISED**

1. Jianping Xu, Structure of Modified Heme Active Site in Chloroperoxidase Following Mechanism-Based Inactivation with Terminal Alkenes and Alkynes, 2003-2004.
2. Haojie Zhu, Mechanisms of Chloroperoxidase Catalyzed Enantioselective Transformations Using NMR Spectroscopy, 2004.
3. Yucheng Jiang, The Chemical Nature of the Copper-Prion Peptide Complexes, 2004-2006.
4. Hedong Bian, Are Prion Proteins Copper Proteins? 2007-2009

### **GRADUATE STUDENTS SUPERVISED**

1. Hui Tian, Ph.D. Designing Chloroperoxidase for Chiral Catalysis, 2005-2010
2. Zheng Wang, Ph.D. Chloroperoxidase Catalyzed Transformation of Poly Aryl Hydrocarbons, 2005-2010
3. Zhonghua Wang, Ph.D. The role of metal ions in the structural transition of prion proteins, 2005-2010
4. Hua Ling, MS. Role of Distal Heme Environment in Chloroperoxidase Catalyzed Chiral Reactions, 2006-2008
5. Rui Zhang, Ph.D. NMR Investigation of the Structure of Enzyme-Substrate Complexes During Chloroperoxidase Catalyzed Enantioselective Transformations, 2007-2012
6. Ling Jiang, Ph.D. Modification of Heme Prosthetic Group in Mechanism-Based Suicidal Inactivation of Heme Thiolate Proteins, 2007-2012
7. Taiyi Chen, MS. Separation of enantiomers of CPO catalyzed epoxidations using chiral HPLC, 2008-2011
8. Elena Shersher, Ph.D. The role of C29 in chloroperoxidase catalysis, 2012-2016
9. Qinghao He, Ph.D. candidate. Degradation of persistent environmental pollutants catalyzed by chloroperoxidase and its mutants, 2012-
10. Elwood Kwong, Ph.D. candidate. The effect of hydrogen bonding network in the proximal ligand loop on the structural and catalytic properties of chloroperoxidase , 2013-
11. Yongjian Guo, Ph.D. candidate. Mechanisms of chloroperoxidase catalyzed chiral epoxidation of selected functionalized olefins-implications in the biosynthesis of mevalonolactone, 2014-

### **UNDERGRADUATE RESEARCHERS**

1. Talibah M. Smith, 2000-2002
2. Brekeitrea M. Jones, 2001-2002
3. Charli C. Searcy, 2004-2005

4. McWilliam Davis, 2004-2005
5. Jessica Murray, 2004-2005
6. Ivonne Weelock, 2005-2006
7. Jing Jing Zeng (Yale University, Summer Internship), 2005
8. Elena Shersher, 2009-2012

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## HIGH SCHOOL STUDENTS TRAINED

1. Ke Ji, currently enrolled as a Graduate Student in Harvard University, 2004 Presidential Scholar.
2. Sunshine W. Yin, Graduated from Princeton University, currently in Harvard Law School.

## PUBLICATIONS

1. Zhang, R., He, Q., Huang, Y., and Wang, X. "Spectroscopic and QM/MM investigations of Chloroperoxidase catalyzed degradation of orange G", *Arch. Biochem. Biophys.* 596, 1-9 (2016).
2. Li, W., Xue, Y., Li, J., Yuan, J., Wang, X., Fang, W., Fang, Z., and Xiao, Y. "A cold-adapted and glucose-stimulated type II  $\alpha$ -glucosidase from a deep-sea bacterium *Pseudoalteromonas* sp. K8", *Biotechnol. Lett.* 38, 345-349 (2016)
3. Fang, W., Yang, Y., Zhang, X., Yin, Q., Zhang, X., Wang, X., Fang, Z., and Xiao, Y. "Improve ethanol tolerance of  $\beta$ -glucosidase Bgl1A by semi-rational engineering for the hydrolysis of soybean isoflavone glycosides", *J. Biotechnol.* 227, 64-71 (2016)
4. Chen, L., Yi, X., Deng, F., Fang, W., Zhang, X., Wang, X., Fang, Z., and Xiao, Y. "A novel ethanol-tolerant laccase, Tvlac, from *Trametes versicolor*", *Biotechnol. Lett.* 38, 471-476 (2016)
5. Zhao, K., Zhou, Y., Qiao, C., Ni, T., Li, Z., Wang, X., Guo, Q., Lu, N., and Wei, L. "Oroxylin A promotes PTEN-mediated negative regulation of MDM2 transcription via SIRT3-mediated deacetylation to stabilize p53 and inhibit glycolysis in wt-p53 cancer cells", *J. Hematol. Oncol.* 8, 1-33 (2015)
6. Yang, Y., Zhang, X., Yin, Q., Fang, W., Fang, Z., Zhang, X., Xiao, Y., and Wang, X. "A mechanism of glucose tolerance and stimulation of GH1  $\beta$ -glucosidases", *Sci Rep* 5, 17296 (2015)
7. Wang, J., Zhang, Y., Xu, Y., Fang, W., Wang, X., Fang, Z., and Xiao, Y. "Genome sequence of a laccase producing fungus *Trametes* sp. AH28-2", *J. Biotechnol.* 216, 167-168 (2015)
8. Fang, Z., Liu, X., Chen, L., Shen, Y., Zhang, X., Fang, W., Wang, X., Bao, X., and Xiao, Y. "Identification of a laccase Glac15 from *Ganoderma lucidum* 77002 and its application in bioethanol production", *Biotechnol. Biofuels* 8, 1-12 (2015)
9. Dai, Q., Yin, Q., Wei, L., Zhou, Y., Qiao, C., Guo, Y., Wang, X., Ma, S., and Lu, N. "Oroxylin A regulates glucose metabolism in response to hypoxic stress with the involvement of Hypoxia-inducible factor-1 in human hepatoma HepG2 cells", *Mol. Carcinog., Mol Carcinog.* 55(8),1275-89 (2016)

10. Zou, M., Hu, C., You, Q., Zhang, A., Wang, X. and Guo, Q. "Oroxylin A induces autophagy in human malignant glioma cells via the mTOR-STAT3-Notch signaling pathway", *Mol. Carcinog.*, 54: 1363–1375. (2015)
11. Yang, H., Hui, H., Wang, Q., Li, H., Zhao, K., Zhou, Y., You, Q., Guo, Q., Lu, N., Zhu, Y., and Wang, X. "Wogonin induces cell cycle arrest and erythroid differentiation in imatinib-resistant K562 cells and primary CML cells", *Oncotarget* 5, 8188-8201 (2014)
12. Fang, W., Song, R., Zhang, X., Zhang, X., Zhang, X., Wang, X., Fang, Z., and Xiao, Y. "Characterization of a Novel  $\beta$ -Glucosidase from *Gongronella* sp. W5 and Its Application in the Hydrolysis of Soybean Isoflavone Glycosides", *J. Agric. Food Chem.* 62, 11688-11695 (2014)
13. Hui, H., Chen, Y., Yang, H., Zhao, K., Wang, Q., Zhao, L., Wang, X., Li, Z., Lu, N., and Guo, Q. "Oroxylin A has therapeutic potential in acute myelogenous leukemia by dual effects targeting PPAR $\gamma$  and RXR $\alpha$ ", *Int. J. Cancer* 134, 1195-1206 (2014).
14. Chen, Y., Hui, H., Yang, H., Zhao, K., Qin, Y., Gu, C., Wang, X., Lu, N., and Guo, Q. "Wogonoside induces cell cycle arrest and differentiation by affecting expression and subcellular localization of PLSCR1 in AML cells", *Blood* 121, 3682-3691 (2013).
15. Zhang, R., He, Q., Chatfield, D., and Wang, X. "Paramagnetic Nuclear Magnetic Resonance Relaxation and Molecular Mechanics Studies of the Chloroperoxidase–Indole Complex: Insights into the Mechanism of Chloroperoxidase-Catalyzed Regioselective Oxidation of Indole", *Biochemistry* 52, 3688-3701 (2013).
16. Zou, M., Lu, N., Hu, C., Liu, W., Sun, Y., Wang, X., You, Q., Gu, C., Xi, T., and Guo, Q. "Beclin 1-mediated autophagy in hepatocellular carcinoma cells: Implication in anticancer efficiency of oroxylin A via inhibition of mTOR signaling", *Cell. Signalling* 24, 1722-1732 (2012).
17. Prabhulkar, S., Tian, H., Wang, X., and Li, C., "Engineered Proteins: Redox Properties and Their Applications", *Antioxid Redox Signal.* (2012)
18. Liu, L., Guo, F., Crain, S., Quilliam, M. A., Wang, X., and Rein, K. S. "The structures of three metabolites of the algal hepatotoxin okadaic acid produced by oxidation with human cytochrome P450", *Bioorg. Med. Chem.* 20, 3742-3745 (2012).
19. Guo, Q. L., Qiang, L., Wu, T., Zhang, H. W., Lu, N., Hu, R., Wang, Y. J., Zhao, L., Chen, F. H., Wang, X. T., and You, Q. D. "HIF-1 $\alpha$  is critical for hypoxia-mediated maintenance of glioblastoma stem cells by activating Notch signaling pathway", *Cell Death Differ.* 19, 284-294 (2012).
20. Yehiayan, L.; Pattabiraman, M.; Kavallieratos, K.; Wang, X.; Boise, L. H.; Cai, Y. *J. Anal. At. Spectrom.* **24**, 1397-1405 (2009).
21. Qi, Q., Gu, H., Yang, Y., Lu, N., Zhao, J., Liu, W., Ling, H., You, Q., Wang, X., and Quo, Q. "Involvement of matrix metalloproteinase 2 and 9 in gambogic acid induced suppression of MDA-MB-435 human breast carcinoma cell lung metastasis," *J. Mol. Med.*, **86**, 1367-77 (2008).
22. Qi, Q., Lu, N., Wang, X., Gu, H., Yang, Y., Liu, W., Li, C., You, Q., and Guo, Q. "Anti-invasive effect of gambogic acid in MDA-MB-231 human breast carcinoma cells," *Biochem Cell Biol.*, **86**, 386-95 (2008).

23. Gu, H., Wang, X., Rao, S., Wang, J., Zhao, J., Ren, F., Mu, R., Yang, Y., Qi Q., Liu, W., Lu, N., Ling, H., You, Q., and Guo, Q. "Gambogic acid mediates apoptosis as a p53 inducer through down-regulation of mdm2 in wild-type p53 expressing cancer cells," *Mol. Cancer Ther.*, **7**, 3298-305 (2008).
24. Gu, H., Yong, Y., You, Q., Zhao, L., Liu, W., Qi, Q., Lu, N., Zhao, J., Wang, J., Mu, R., Wang, X., and Guo, Q. "Gambogic acid induced tumor cell apoptosis by T lymphocyte activation in H22 transplanted mice," *Int. Immunopharmacol.*, **8**, 1493-502 (2008).
25. Zhang, K., Guo, Q., You, Q., Yong, Y., Zhang, H., Yang, L., Gu, H., Qi, Q., Tan, Z., and Wang, X. "Wogonin induces the granulocytic differentiation of human NB4 promyelocytic leukemia cells and up-regulates phospholipid scramblase 1 gene expression," *Cancer Sci.*, **99**, 689-695 (2008).
26. Lu, N., Yang, Y., You, Q.-D., Ling, Y., Gao, Y., Gu, H.-Y., Zhao, L., Wang, X.-T., and Guo, Q.-L. "Gambogic acid inhibits angiogenesis through suppressing vascular endothelial growth factor-induced tyrosine phosphorylation of KDR/Flk-1," *Cancer Lett.*, **258**, 80-89 (2007).
27. Yang, Y., Yang, L., You, Q.-D., Nie, F.-F., Gu, H.-Y., Zhao, L., Wang, X.-T., and Guo, Q.-L. "Differential apoptotic induction of gambogic acid, a novel anticancer natural product, on hepatoma cells and normal hepatocytes," *Cancer Lett.*, **256**, 259-266 (2007).
28. Yu, J., Guo, Q., You, Q., Zhao, L., Gu, H., Yang, Y., Zhang, H.-w., Tan, Z., and Wang, X. "Gambogic acid induced G2/M phase cell cycle arrest via disturbing CDK7 mediated phosphorylation of CDC2/P34 in human gastric carcinoma BGC-823 cells," *Carcinogenesis* **28**, 632-638 (2007).
29. Hu, Y., Yang, Y., You, Q.-D., Liu, W., Gu, H.-Y., Zhao, L., Zhang, K., Wang, W., Wang, X.-T., and Guo, Q.-L. "Oroxilin A induced apoptosis of human hepatocellular carcinoma cell line HepG2 was involved in its antitumor activity," *Biochem. Biophys. Res. Commun.*, **351**, 521-527 (2006).
30. Wang, W., Guo, Q., You, Q., Zhang, K., Yang, Y., Yu, J., Liu, W., Zhao, L., Gu, H., Hu, Y., Tan, Z., and Wang, X. "Involvement of bax/bcl-2 in wogonin-induced apoptosis of human hepatoma cell line SMMC-7721," *Anticancer. Drugs*, **17**, 797-805 (2006)
31. Wang, W., Guo, Q.-L., You, Q.-D., Zhang, K., Yang, Y., Yu, J., Liu, W., Zhao, L., Gu, H.-Y., Hu, Y., Tan, Z., and Wang, X.-T. "The Anticancer Activities of Wogonin in Murine Sarcoma S180 both *in Vitro* and *in Vivo*," *Biol. Pharm. Bull.*, **29**, 1132-1137 (2006).
32. Yu, J., Guo, Q.-L., You, Q.-D., Lin, S.-S., Li, Z., Gu, H.-Y., Zhang, H.-w., Tan, Z., and Wang, X. "Repression of telomerase reverse transcriptase mRNA and hTERT promoter by gambogic acid in human gastric carcinoma cells," *Cancer Chemother. Pharmacol.*, **58**, 434-443 (2006).
33. Guo, Q.-L., Lin, S.-S., You, Q.-D., Gu, H.-Y., Yu, J., Zhao, L., Qi, Q., Liang, F., Tan, Z., and Wang, X. "Inhibition of human telomerase reverse transcriptase gene expression by gambogic acid in human hepatoma SMMC-7721 cells," *Life Sci.*, **78**, 1238-1245 (2006).
34. Xu, J., Yan, J., Wang, X., Yu, H., and Milliken, T. "Photochemical reaction of chrysene in acetonitrile/water." *Polycycl. Aromat. Comp.*, **24**(4-5), 249-256 (2004).
35. Carrell, C.J., Wang, X., Jones, L., Jarrett, W.L., Davidson, V.L., Jarrett, W.L., and Mathews, F. S. "Crystallographic and NMR investigation of cobalt-substituted amicyanin." *Biochemistry*, **43**, 9381-9389 (2004).

36. Zhang, J., Osborne, J. P., Gennis, R. B., and Wang, X. "Proton NMR Study of the Heme Environment in Bacterial Quinol Oxidases." *Arch. Biochem. Biophys.*, **421**(2): 186-191 (2004).
37. Wang, X., Tachikawa, H., Yi, X., Manoj, K. M., and Hager, L. P., "Two Dimensional NMR Study of the Heme Active Site Structure of Chloroperoxidase in Solution." *J. Biol. Chem.*, **278**, 7765-7774 (2003).
38. Feng, M., Tachikawa, H., Wang, X., Pfister, T., Gengenbach, A., and Lu, Y. "Resonance Raman Evidences of Perturbations to the Heme Active Site Structure by the Engineered Mn(II) Binding Site in Cytochrome *c* Peroxidase." *J. Biol. Inorg. Chem.*, **8**, 699-706 (2003).
39. Rosenblatt, M. M., Huffman, D. L., Wang, X., Rmmer, H. A., and Suslick, K. S., "Cyclic and hairpin peptide complexes of heme." *J. Am. Chem. Soc.* **124**, 12394-12395 (2002).
40. Sun, D., Wang, X., and Davidson, V. L., "Redox Property of an Engineered Purple Cu<sub>A</sub> Azurin." *Arch. Biochem. Biophys.*, **404**, 158-162 (2002).
41. Jiao, Y., Valente, E., Garner, S. T., Wang, X., and Yu, H. "Unexpected thermal rearrangement of N-alkoxycarbonyl imidazole acryl azides to imidazo[1,5-*c*]pyrimidinone or imidazo[4,5-*c*] pyrimidinone," *Tetrahedron Lett.*, **43**, 5879-5881 (2002).
42. Sigman, J. A., Wang, X., and Lu, Y. "Coupled Oxidation of Heme by Myoglobin Is Mediated by Exogenous Peroxide," *J. Am. Chem. Soc.*, **123**, 6945-6946 (2001).
43. Gengenbach, A., Wang, X., and Lu, Y. "Designing a Manganese Peroxidase," in "Fundamentals and Catalysis of Oxidative Delignification Processes," Dimitris S. Argyropoulos, Ed., ACS: Washington, D.C. pp487-499 (2001).
44. Berry, S. M., Wang, X., and Lu, Y. "Ligand Replacement Study at the His120 Site of Purple Cu<sub>A</sub> Azurin," *J. Inorg. Biochem.* **78**, 89-95 (2000).
45. Wang, X., Ang, M. C., and Lu, Y. "Stopped Flow investigation of the Mechanisms of Cu<sup>2+</sup> Incorporation into an Engineered Purple Cu<sub>A</sub> Center," *J. Am. Chem. Soc.* **121**, 4927-4928 (1999).
46. Wang, X., Berry, S. M., Xia, Y., Lu, Y. "The Role of Histidine Ligands in the Structure of Purple Cu<sub>A</sub> Azurin," *J. Am. Chem. Soc.* **121**, 7449-7450 (1999).
47. Wang, X. and Lu, Y. "Proton NMR Investigation of the Heme Active Site Structure of an Engineered Cytochrome *c* Peroxidase that Mimics Manganese Peroxidase," *Biochemistry*, **38**, 9146-9157 (1999).
48. Gengenbach, A., Syn, S. Wang, X., and Lu, Y. "The Redesign of Cytochrome *c* Peroxidase into a Manganese Peroxidase: The Role of Tryptophans in Peroxidase Activity," *Biochemistry* **38**, 11425-11432 (1999).
49. Yi, X., Mroczko, M., Manoj, K. M., Wang, X., and Hager, L. P. "Replacement of the Proximal Heme Thiolate Ligand in Chloroperoxidase with a Histidine Residue." *Proc. Natl. Acad. Sci. U. S. A.* **96**, 12412-12417 (1999).
50. Hay, M. T., Ang, M. C., Gamelin, D. R., Solomon, E. I., Antholine, W. E., Ralle, M., Blackburn, N. J., Massey, P. D., Wang, X., Kwon, A. K., and Lu, Y. "Spectroscopic Characterization of an Engineered Purple Cu<sub>A</sub> Center in Azurin," *Inorg. Chem.* **37**, 191-198 (1998).
51. Wang, X. and Morden, K. M. "NMR Characterization of Amphipathic Helical Peptides," *Methods Mol. Biol.* (Totowa, N. J.) **78**:85-112 (1997).

52. Wang, X. and Goff, H. M. "A Nuclear Paramagnetic Relaxation Study of the Interaction of Cyclic  $\beta$ -Diketone Substrates with Chloroperoxidase," *Biochem. Biophys. Acta* **1339**, 88-96 (1997).
53. Yeung, B. K. S., Wang, X., Sigman, J. A., Petillo, P. A., and Lu, Y. "Construction and Characterization of a Manganese-Binding Site in Cytochrome *c* Peroxidase: toward a Novel Manganese Peroxidase," *Chem. Biol.* **4**, 215-221 (1997).
54. Dugad, L. B., Wang, X., Wang, C-C., Lukat, G. S., and Goff, H. M. "Proton Nuclear Overhauser Effect Study of the Heme Active Site Structure of Chloroperoxidase"; *Biochemistry* **31**, 1651-1655 (1992).