

ANDREA DECKER

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Education

- **Ph.D.** in Bio-Inorganic Chemistry, Stanford University, CA, anticipated Spring 2006
Thesis: "Oxygen Intermediates in Mononuclear Non-Heme Iron Systems: Spectroscopy and Electronic Structure Calculations"
Advisor: Professor Edward I. Solomon
- **Diplom** in Chemistry, Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen, Germany, 1999
Thesis: "Quantum Chemical Investigations into Antiferromagnetism"
Advisor: Professor Richard Dronskowski

Research Experience

2000 – present Graduate Research, Stanford University, CA; with Prof. E. I. Solomon

Studied structure-function correlation in metallo-enzymes

- Modeled the kinetics and thermodynamics of enzymatic reaction mechanisms; Analyzed the electronic structures and bonding of oxygen intermediates in iron enzymes and biomimetic model complexes using density functional theory (DFT) (Gaussian and ADF program packages)
- Experimentally characterized the electronic structures of enzyme intermediates and model complexes using a variety of spectroscopic techniques: UV/Vis absorption, magnetic circular dichroism (MCD), electron paramagnetic resonance, and resonance raman; developed new MCD methodology for high-valent Fe(IV)-oxo systems
- Improved techniques for preparation of air- and temperature-sensitive biochemical samples

1999 Diplom Research, RWTH Aachen, Germany; with Prof. R. Dronskowski

- Developed a qualitative model for the origins of antiferromagnetism in crystalline solids using electronic band-structure calculations (YAEHMOP and LMTO program packages)

1997 – 1998 Undergraduate Research, RWTH Aachen, Germany

- Investigated the electronic structures of transition metal oxides (Theoretical solid state chemistry, with Prof. R. Dronskowski)
- Optimized process parameters for Syngas conversion on heterogeneous catalysts (Technical chemistry, with Prof. W. Keim)

1995 – 1996 Undergraduate Research, University of Leeds, UK; with Prof. K. Bartle

- Designed methods for essential oil fractionation using supercritical fluids

Teaching Experience

2000 – present Department of Chemistry, Stanford University

- Trained and supervised PhD students
- As Teaching Assistant taught small-group sessions, tutored students one-on-one, set up and supervised lab work, prepared and presented review sessions, wrote and supervised exams, and graded homework, lab reports and exams. Specific courses include: graduate-level physical inorganic chemistry (Winter 2004); undergraduate general and advanced inorganic chemistry (2000-2002); introductory organic chemistry laboratory (Spring 2001)

Language Skills

- German: Native speaker
- English: Written and oral fluency
- Spanish, French: Basic writing and conversational skills

Publications

12. **Decker, A.**; Chow, M.S.; Kemsley, J.N.; Lehnert, N.; Solomon, E.I.: "Direct Hydrogen-Atom Abstraction by Activated Bleomycin: An Experimental and Computational Study." *J. Am. Chem. Soc.*, **2006**, in press.
11. **Decker, A.**; Clay, M.D.; Solomon, E.I.: "Spectroscopy and Electronic Structures of Mono- and Binuclear High-Valent Non-Heme Iron-Oxo Systems." *J. Inorg. Biochem.*, **2006**, in press.
10. Neidig, M.L.; **Decker, A.**; Kavana, M.; Moran, G.R.; Solomon, E.I.: "Spectroscopic and Computational Studies of NTBC Bound to the Non-Heme Iron Enzyme (4-Hydroxyphenyl) pyruvate Dioxygenase: Active Site Contributions to Drug Inhibition." *Biochem. Biophys. Res. Commun.* **2005**, 338, 206-214.
9. **Decker, A.**; Solomon, E.I.: "Dioxygen activation by copper, heme and non-heme iron enzymes: comparison of electronic structures and reactivities." *Curr. Opin. Chem. Biol.* **2005**, 9, 152-163.
8. **Decker, A.**; Solomon, E.I.: "Comparison of Fe(IV)=O Heme and Non-Heme Species: Electronic Structures, Bonding, and Reactivities." *Angew. Chem.* **2005**, 117, 2292-2295; *Angew. Chem. Int. Ed.* **2005**, 44, 2252-2255.
7. **Decker, A.**; Rohde, J.-U.; Que, L.; Solomon, E.I.: "Spectroscopic and quantum chemical characterization of the electronic structure and bonding in a non-heme Fe(IV)=O complex." *J. Am. Chem. Soc.* **2004**, 126, 5378-5379.
6. Solomon, E.I.; **Decker, A.**; Lehnert, N.: "Non-heme iron enzymes: Contrasts to heme catalysis." *Proc. Natl. Acad. Sci. U. S. A.* **2003**, 100, 3589-3594.
5. Davis, M.I.; Wasinger, E.C.; **Decker, A.**; Pau, M.Y.M.; Vaillancourt, F.H.; Bolin, J.T.; Eltis, L.D.; Hedman, B.; Hodgson, K.O.; Solomon, E.I.: "Spectroscopic and electronic structure studies of 2,3-dihydroxybiphenyl 1,2-dioxygenase: O₂ reactivity of the non-heme ferrous site in extradiol dioxygenases." *J. Am. Chem. Soc.* **2003**, 125, 11214-11227.
4. Kemsley, J.N.; Zaleski, K.L.; Chow, M.S.; **Decker, A.**; Shishova, E.Y.; Wasinger, E.C.; Hedman, B.; Hodgson, K.O.; Solomon, E.I.: "Spectroscopic studies of the interaction of ferrous bleomycin with DNA." *J. Am. Chem. Soc.* **2003**, 125, 10810-10821.
3. **Decker, A.**; Landrum, G.A.; Dronskowski, R.: "Structural and electronic Peierls distortions in the elements (A): The crystal structure of tellurium." *Z. Anorg. Allg. Chem.* **2002**, 628, 295-302.
2. **Decker, A.**; Landrum, G.A.; Dronskowski, R.: "Structural and electronic Peierls distortions in the elements (B): The antiferromagnetism of chromium." *Z. Anorg. Allg. Chem.* **2002**, 628, 303-309.
1. Liu, X.H.; **Decker, A.**; Schmitz, D.; Dronskowski, R.: "Crystal structure refinement of lead cyanamide and the stiffness of the cyanamide anion." *Z. Anorg. Allg. Chem.* **2000**, 626, 103-105.

Oral and Poster Presentations

5. "Oxygen Intermediates in Mononuclear Non-Heme Iron Sites: Electronic Structures, Reactivities and Comparison to Heme Systems." Oral presentation at the 10th Gordon Graduate Research Seminar on Bioinorganic Chemistry, Ventura, CA, **2005**.
4. "Mononuclear Non-Heme Fe(IV)=O Systems: Electronic Structures and Comparison to Heme and Copper Species." Poster presentation at the 12th International Conference on Biological Inorganic Chemistry (ICBIC), Ann Arbor, MI, **2005**.

3. "Oxygen intermediates in mononuclear non-heme iron sites: Electronic structure and reactivity." Poster presentation at the 227th National Meeting of the American Chemical Society (ACS), Anaheim, CA, **2004**.
2. "Computational Bioinorganic Chemistry: Interaction of Non-Heme Iron Enzymes with Dioxygen." Poster presentation at the 4th Biomedical Computation@Stanford (BCATS) Symposium, Stanford, CA, **2003**.
1. "Interactions of mononuclear non-heme iron sites with dioxygen: Studies on electronic structure and reactivity." Poster presentation at the 11th International Conference on Biological Inorganic Chemistry (ICBIC), Cairns, Australia, **2003**.

References

Available upon request.