

SARA-KAYE MADSEN, Ph. D., Chemistry, Lecturer

EDUCATION

- **8/92-8/98** Ph. D., Chemistry; Doctoral Advisor: Professor D. Scott Bohle, Department of Chemistry, University of Wyoming, Laramie, Wyoming, 82071
Dissertation Title: Spectroscopic and Structural Characterization of Hemozoin; The Aggregated Heme Detoxification by-Product Formed in Malarial late Stage Trophozoites.
- **4/84-6/88** B.S., Chemistry, Undergraduate Advisor: Professor Clint Duncan, retired, Department of Chemistry, Central Washington University, Ellensburg, Washington, 98926,
Undergraduate Research Title: Identification of Pigments in Inks.

PUBLICATION LIST

Academic

1. Madsen, S. K.; Organic Chemistry and Biochemistry Laboratory Manual, 1st edition, BlueDoor Publishing, Minnetonka, MN, 2013.

Invited Editorial

1. Reviewed three modules for Mastering Chemistry™. Mastering Chemistry is an online assessment tool for instructor. The modules that were reviewed were balancing chemical equations, chemical formulas for covalent and ionic compounds, and conversion factors, completed, on time, 2012.
2. Pearson Publishing, K. Timberlake, 12th edition, Mastering Chemistry, reading quizzes, 18 chapters, completed on time, 11/1/2013.

Doctoral

1. Bohle, D. S.; Madsen, S. K.; Kosar, A. D. *Biochem. Biophys. Res. Comm.* **294**, **2002**, 132-135.
2. Pagola, S.; Stephens, P. W.; Bohle, D. S.; Madsen, S. K. *Nature*, The structure of Malaria Pigment β -Haematin, **404**, **2000**, pp.307-310.
3. Bohle, D. S.; Debrunner, P.; Jordan, P. A.; Madsen, S. K.; Schultz, D. J. *Amer. Chem. Soc.* **1998**, **120**, pp. 8255-8256.
4. Barnes, C. J.; Bohle, D. S.; Dinnebier, R. E.; Madsen, S. K.; Stephens, P. W. *Inorg. Chem.* **1997**, **25**. Pp. 5793-5798.
5. Barnes, C. M.; Bohle, D. S.; Madsen, S. K.; *Inorg. Chem.* **1994**, **33**, pp. 6411-6414.
6. Bohle, D. S.; Dinnebier, R. E.; Madsen, S. K.; Stephens, D. W. *J. Biol. Chem.* **1997**, **272**, pp. 713-716.
7. Bohle, D. S.; Conklin, B. J.; Cox, D.; Madsen, S. K.; Paulson, S.; Stephens, P. W.; Yee, G. T. Inorganic and Organometallic Polymers II, Advanced Materials and Intermediates; Wisian-Neilson, P.; Allcock, H. R.; Wynne, K. J. Ed.; ACS Symposium Series 572, American Chemical Society: Washington, DC, **1994**, pg. 505.

Postdoctoral

1. Madsen, S. K.; Mooney, D. *J. Pharm. Sci. Tech. Today*, Delivering DNA with polymer Matrices: Applications in Tissue Engineering and Gene Therapy, **2000**, **3**(11), pp. 381-384, (*invited*).

Industrial

1. United States Patent, US 5,286,412, February 15, **1994**, Modified Lignosulfonate Dispersant for Gypsum, Robert A. Northey, Sara-Kaye Madsen.
2. Fiske, L. B.; Hunington, H.; Buchholz, R.; Madsen, S. K. Residues and Effluents Processing and Environmental Considerations; Reddy, R. G.; Imrie, W. P.; Queneau, P. B. Ed.; TMS Publications, **1992**, pp. 871-876.

Public Appearances

1. USDSU Marketing Commercial, June 2006; I was invited to organize a chemistry department section in a 30 second commercial for publicizing USDSU. (UniversityCenter was called USDSU.)
2. Argus Leader (Sioux Falls, SD local paper), front page, July 2004, My summer chemistry course was visited by the Argus leader for a photo shoot to publicized USDSU in the local paper.

TEACHING

1. A full listing of my teaching experiences with course number, course name, credit hours, and semesters taught is submitted as a supplement and is attached to end of my CV.
2. Some courses taught were on Main Campus (MC) for SDSU and these courses are listed with (MC). Otherwise, all other courses for SDSU were taught in Sioux Falls for SDSU.

- Lecturer — South Dakota State University, (2012-present)
Undergraduate: General Chemistry I and II, lab and lecture; Organic Chemistry and Biochemistry, lab and lecture; Advance Inorganic Chemistry, lab and lecture.
Graduate: Advanced Inorganic Chemistry, lecture.
- Associate Professor — South Dakota State University, (2009-2012)
Undergraduate: General Chemistry I and II, lab and lecture; Organic Chemistry and Biochemistry, lab and lecture; Advance Inorganic Chemistry, lab and lecture.
Graduate: Advanced Inorganic Chemistry, lecture and lab.
- Assistant Professor — South Dakota State University, (2003-2009)
Undergraduate: General Chemistry I and II, lab and lecture; Organic Chemistry and Biochemistry, lab and lecture (non-science, GOB); Advance Inorganic Chemistry, lab and lecture.
Graduate: Advanced Inorganic Chemistry, lecture.
- Assistant Professor — Truman State University, (2001-2003)
Undergraduate: Introduction to Chemistry, Organic Chemistry (300 level, both semesters, 2001-2003)

RESEARCH

POSTDOCTORAL RESEARCH

- **4/00-10/02** I was part of an interdisciplinary team of scientists under the direction of Dr's. Cliff Unkefer and Basil Swanson at Los Alamos National Laboratory. In this research, we synthesized and manufactured fluorescence resonance energy transfer (FRET) based biosensors for early detection of disease. Team members backgrounds are composed of biomedical, engineering, materials, organic and inorganic chemistry, and polymers sciences. My collaboration involved synthesis and binding of pathogen specific recognition molecules to an organic linker which is a junction between the sensor platform and recognition molecule. Our basic linkers were originated from a homoserine and lysine synthetic scheme which contained an amine, C₁₈ alkyl chain, and fluorophore. Bioconjugate and organic chemistry methods are used to synthesize and assemble the linker, amine C₁₈, and fluorophore. Due to proprietary information this description is general; however, further discussions under formal conditions can be arranged.
- **10/98-4/00** My postdoctoral appointment with Dr. David J. Mooney at the University of Michigan in the School of Dentistry and Chemical Engineering involved a large cross section of biological and material science research. Biodegradable polymers poly(lactide-co-glycolide), alginate, and derivatized alginate were synthesized and utilized in tissue engineering, drug delivery and gene therapy applications. This research provided a formal opportunity to expand my chemistry education and skills into the biological sciences and nanotechnology. I handled and manipulated DNA, viruses, proteins, and radioactive DNA and proteins, and synthesized and characterized various polymers. I performed a wide variety of in vitro and in vivo experiments which involved cell culturing techniques especially in the application of materials research and design and animal surgery. Furthermore, I have demonstrated the extension of my abilities such as to multi-task, leading a wide range of projects, organizing collaborations with other research groups, and mentoring undergraduate and graduate students, with the addition of dental students, acquiring additional experiences outside of dentistry.

GRADUATE RESEARCH

- **8/92-8/98** At the University of Wyoming in the Department of chemistry, my Ph. D. candidacy was with **Dr. D. Scott Bohle**. The doctoral project involved the characterization of β -hematin. β -hematin, a detoxification by-product formed during late stage malarial trophozoite parasitic infection, is a crystalline synthetic heme analogue to malaria pigment. The characterization of β -hematin and malarial pigment involved many solid state spectroscopic, magnetochemical, and x-ray diffraction physical methods: IR, Raman, UV, diffuse reflectance and electron paramagnetic resonance (ESR), magnetic circular dichroism (MCD), Mössbauer, nuclear magnetic resonance (NMR), magnetic susceptibility, and X-ray powder diffraction using synchrotron radiation.

INDUSTRIAL RESEARCH

- **8/89-8/92** Position: *Senior Laboratory Technician, Georgia-Pacific Corporation, Tacoma, Washington*. Research Director; **Dr. Robert Northey**. I performed research and product development on lignosulfonate which is the poly phenolic bio-polymer retained after pulping wood for cellulose. As a technician my project responsibilities included testing lignosulfonate products for the oil well industry and I later was promoted to the responsibility for a product used in the wallboard industry.
- **7/88-7/89** Position: *Laboratory Technician, Chemical Processors, Seattle, Washington, facility manager*. Superior; David Aubry. My first place of post-baccalaureate employment involved daily monitoring, regulation and small scale testing of hazardous waste. The primary responsibility was the poly(chlorinated bi-phenyl) (PCB) program which involved zero error bookkeeping of in-house PCB waste, directing their proper storage location and proper treatment, and submitting samples of waste for PCB quantization by mass spectrophotometry (MS).

Research Mentorships (graduate student)

- 6/97-8/97 I mentored an undergraduate student (Susanne Wheelless) who was a participant in the NSF funded program titled Research Experiences for Undergraduates (REU) within the research program of Dr. D. Scott Bohle at the University of Wyoming where we performed preliminary experiments on β -hematin using nitric oxide (NO) donors and observed possible degradation of the bio-polymer.
- 6/95-8/95 I mentored another undergraduate student (Kathleen Kinyon) who was a participant in the REU program under the research program of Dr. D. Scott Bohle at the University of Wyoming. Here, we synthesized a heme analogue called ferric meso-protoporphyrin-IX. This compound was used for its increased organo- solubility through Pd/H₂ reduction of the vinyl side groups to ethyl groups at the β -pyrrolic position of the heme. This allowed for synthesizing a larger crystallite of an derivatized β -hematin which were further studied by powder diffraction using X-ray synchrotron radiation.
- 1/95-5/95 I mentored an undergraduate student majoring in biology at the University of Wyoming. This experience assisted the student to gain laboratory experience in chemistry. Here, we synthesized a heme analogue called ferric deuteroporphyrin-IX. Utilization of this compound was in the potential chemistry at the β -pyrrolic position of the heme by. We used the methyl heme analogue to synthesize a derivatized β -hematin.

Postdoctoral Mentorships

- 10/98-4/00 1) I mentored a first year graduate student on the synthesis of binding cell adhesion molecules (ie, RGD) to alginate which is a biodegradable polymer extracted from seaweed. 2) I mentored the first Ph. D./D.D.S. student at the University of Michigan Dental School on DNA delivery from alginate which was used for gene therapy and tissue engineering applications. 3) I mentored an undergraduate on synthesizing injectable alginate beads which are also used for gene therapy and tissue engineering applications and oversaw their duties involving ordering and removal of hazardous waste for the Mooney laboratory.

Academic Mentorships

- 8/03-current; I have been scheduling, hiring, and training all the chemistry lab assistant personnel in conjunction with the facility manager (Barb Wagley) at USDSU. These student's abilities in chemistry are vary, however, their main charge is tutoring, preparing labs, washing dishes, cleaning the lab, and handling chemical waste.

PROFESSIONAL ASSOCIATIONS

American Chemical Society, member, 1990-2005
United Way Group Leader, September-November 2002 (invited)
Association for Women in Science, 1996-1997
American Society of Gene Therapy, 1998-2003
Alpha Chi Sigma/Gamma Theta Chapter (Truman State University), member, 2001-2003
Autism Society of American, 2002-2003

PROFESSIONAL COMMITTEES

Graduate Admissions Committee, SDSU, 2013-present.
Curriculum Committee, SDSU, 2007-2009.
Search Committee for Chemistry Education, lecturer track, 2013
USDSU Faculty Governance, USDSU, volunteer with five other members, 2005.
Search Committee for Chemistry Education tenure track position, SDSU, invited, 2004.
Search Committee for Dean of the Graduate School, 1998, University of Wyoming, invited.
Senior Portfolios, 2002 and 2003, reader and evaluator, Truman State University.

POSTERS AND PRESENTATIONS

1993 ACS Conference, Denver, Colorado, poster.
1997 ACS Conference, San Francisco, California, poster.
1997 Regional Inorganic Chemistry Snow Conference, Steamboat, Colorado, talk.
1998 Research Presentation to Dr. Thomas Spiro, Princeton University, talk.
1998 University of Michigan Dental Table Clinic Day, poster.
1999 Keystone Symposia, Gene Therapy: The Next Millennium, poster.
2000 University of Michigan Dental Table Clinic Day, poster, **3rd prize.**
2001 Morehouse College, FOCUS 2001 Conference, talk.
2001 Truman State University, Undergraduate Research Symposium

2002 34th annual Great Lakes Regional meeting, ACS, Minneapolis, MN, June 2-4, 2002, poster.
2014 BCCE, Aug. 2014, talk.

Truman State University, Fall 2001-Spring 2003:

Chemistry 100 with lab, Chemistry for non-science majors
Chemistry 329, Organic Chemistry I Lecture
Chemistry 331, Organic Chemistry II Lecture
Chemistry 332, Organic Chemistry II Lab
Chemistry 333, Organic Chemistry Lab, called Superlab
(a one semester course that combined Chem 330 & Chem 332 labs)

South Dakota State University, Fall 2003-present:

- Chemistry 106/106L, General Chemistry, Survey, non-science majors
Chemistry 108/108L, General Organic Chemistry and Biochemistry, Survey, non-science majors
Chemistry 112/112L, General Chemistry I, science majors
Chemistry 114/114L, General Chemistry II, science majors
Chemistry 452/452L, Inorganic Chemistry (offered every other year), main campus course
Chemistry 654 (also 691), Advance Inorganic Chemistry, main campus course
- **Fall 2004 to Current**, Laboratory Coordinator for Chemistry 108, coordinate and plan experiments, mentor, guide, and evaluate graduate student TA's and instructors, and write quizzes, assignments, prelabs, questions, and experimental procedures.
 - **Summer Semesters starting with 2004 to Current**, Chemistry 108, Chemistry 112 and Chemistry 114. I have taught all the labs that accompany these courses.
 - **Fall 2008, Fall 2010-Current**, Chemistry 452 and 452L; (lecture and lab respectively). This course is offered every other year. I have taught the lecture and I coordinate the lab which involves coordinating, planning and writing experiments and experimental procedures, mentor, guide, and evaluate graduate student TA's, write quizzes, exams, assignments, prelabs, and other questions.
 - **Spring 2003**, TOTAL contact hours=15 My teaching responsibilities included Chemistry 100 for non-science majors (lecture and laboratory) and Chemistry 331 Organic Chemistry II lecture (two sections). The Chemistry 331 will be a second semester continuation of Chemistry 329, Organic Chemistry I lecture.
 - **Fall 2002**, TOTAL contact hours=16, Aside from my teaching load for Chemistry 100 for non-science majors, Chemistry 329 Organic Chemistry I lecture, and Chemistry 332 Organic Chemistry II with laboratory and recitation, I was an invited faculty member to teach during Truman Week at Truman State University for Fall 2002. Truman Week is a time set aside prior to fall semester of each new academic year for new and incoming freshman to learn and acclimate to college life at Truman State University. Twenty-four freshman students and I spent one week prior to Fall semester, August 18-23, 2002 acquainting each other, learning chemistry concepts in a non traditional setting, becoming familiar with the meaning of a liberal arts education, and socialized.
 - **Spring 2002** TOTAL contact hours=15, Chemistry 100 with lecture and lab; chemistry for non science majors, Truman State University, lecture 3 contact hours; TTh section (full, 48 students) at 1.5 hours, 2 lab sections at 2 hours each, grader is Renee Schlichting; accounting major) for 2 hours per week. Chemistry 333 This class is organic chemistry with recitation and laboratory for chemistry majors. Chemistry 333 is called Superlab and this course involves the consolidation of two semesters of organic chemistry laboratory into one semester. laboratory is 6 contact hours; 3 hours on MW, recitation is 2 contact hours; 1 hour MW, TA is Kurt Hoeman; junior chemistry major, 4 hours per week.
 - **Spring Semester 1993** teaching assistant for Dr. Vern Archer, University of Wyoming, Quantitative Analysis
 - **Fall Semester 1994** teaching assistant for Dr. David Jaeger, University of Wyoming, non-mathematical based General Chemistry.