

GREGORY DAVID PHELAN

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EDUCATION

- 1998 - 2003 **Ph. D.**, Chemistry (Materials), University of Washington
M. S., Chemistry, University of Washington
"Synthesis and Design of Luminescent Materials"
Professor Larry Dalton, Research Advisor
- 1998 – 2003 **M. Ed.**, Education, University of Washington
"Content Sequencing in the General Chemistry Curriculum"
Professor Francis Hunkins, Research Advisor
Professor Mark Windschitl, Research Advisor
Concentration in Curriculum Development
- 1995 - 1998 **M. S.**, Chemistry (Polymer/Physical), University at Albany
"Synthesis and Characterization of Interpenetrating Polymer Networks
consisting of Poly (2, 6 dimethyl – 1, 4 – phenylene oxide) and
Polyvinyl pyridine"
Professor Harry Frisch, Research Advisor
Award: "Arthur O. Long Excellence in Teaching Award"
- 1990 - 1994 **B. S.**, Chemical Engineering, University of Rochester

DISSERTATION RESEARCH ACCOMPLISHMENTS

Doctorate in Chemistry focusing in Materials Chemistry

Designed and synthesized a series of metal complexes for use as light sources in applications including, Organic Light Emitting Devices, pressure sensors, and temperature sensors. The complexes consisted of luminescent ligands that would bind to lanthanide or transition metals. The ligands incorporated polycyclic hetero and homonuclear aromatic compounds and various other functionalities that served as a light harvesting material. The metal complexes were synthesized such to optimize the light emitting properties of the complexes.

Masters in Education in Curriculum and Instruction with a concentration in Teaching and Learning

Studied the effect of curricular changes on general chemistry by examining the effect of early introduction of Bonding Theory/Lewis Structures in general chemistry. Students that were exposed to advanced organizers such as the ability to draw Lewis Structures scored marginally higher in exams but reported a higher sense of confidence with the subject matter.

Masters in Physical Chemistry focusing on Polymeric Chemistry

Synthesized a copolymer of polyvinyl pyridine and poly (2, 6-dimethyl-1, 4 – phenylene oxide). The Interpenetrating Polymer Network was designed to optimize the thermal properties showed no phase separation high thermal stability.

TEACHING and RESEARCH EXPERIENCE

2000 –	Assistant Professor, Seattle Pacific University	Seattle, WA
2004 –	Affiliate Professor, University of Washington	Seattle, WA
2002	Science Consultant, The Villa Academy	Seattle, WA
2001 – 2003	National Science Foundation “GK-12 Fellow”	Seattle, WA
2000	Instructor, North Seattle Community College	Seattle, WA
1999 – 2001	Instructor, Bellevue Community College	Bellevue, WA
1999	Instructor, Green River Community College	Auburn, WA
1998 – 2001	Teaching Assistant, University of Washington	Seattle, WA
1997 – 1998	University Facilitator, University of Albany	Albany, NY
1996 – 1998	Teaching Assistant, University at Albany	Albany, NY
1992 – 1994	Teaching Assistant, University of Rochester	Rochester, NY

AFFILIATIONS

National Science Foundation – Materials and Devices for Information Technology Research

Washington Technology Center – Microfabrication Laboratory User

Alpha Chi Sigma

American Chemical Society

Division of Chemical Education, Organic Chemistry, Inorganic Chemistry

Puget Sound Division – Executive Committee – *Secretary* – 2004

Advisor – Seattle Pacific University – Student Affiliates Chapter American Chemical Society

PATENTS/DISCLOSURES

- 1) “Lanthanide Complexes for use as Temperature Sensing Materials” submitted to the University of Washington Office of Technology Transfer, June 2001
- 2) “Hyperpolarizable organic chromophores” submitted to the University of Washington Office of Technology Transfer, 2001, US, WO, EP, JP Patents pending
- 3) “Osmium complexes and related organic light-emitting devices” submitted to the University of Washington Office of Technology Transfer, June 2002, submitted to USPTO June 2003, US patent pending
- 4) “Increased efficiency in organic light emitting devices” submitted to the University of Washington Office of Technology Transfer, 2003
- 5) “Tunable emission from osmium complexes for use in organic light emitting technology” submitted to the University of Washington Office of Technology Transfer, 2003
- 6) “Highly active 2nd order non-linear chromophores based on 2,2’-bi{3,4-dihydro-2H-thieno[3,4-b][1,4]dioxepine} bridges” submitted to the University of Washington Office of Technology Transfer, 2004
- 7) “Corrosion Sensors” submitted to the University of Washington Office of Technology Transfer, 2004
- 8) “Polymeric based sensor paints containing metal complexes” submitted to the University of Washington Office of Technology Transfer, 2004
- 9) “Metal based luminescent materials” submitted to the University of Washington Office of Technology Transfer, 2005
- 10) “Luminescent metal complexes” submitted to the University of Washington Office of Technology Transfer, 2005
- 11) “Metal based Near-Infrared emitters” submitted to the University of Washington Office of Technology Transfer, 2005
- 12) “Polymeric host materials for use in Organic Light Emitting Devices” submitted to the University of Washington Office of Technology Transfer, 2005

PUBLICATIONS

- 1) Dalton, L., Steier, W., Robinson, B., Zhang, B., Ren, A., Garner, S., Chen, A., Londergan, T., Irwin, L., Carlson, B., Fifield, L., Phelan, G. D., Kincaid, C., Amend, J., Jen, A. K.-Y., *J. Chem. Mater.*, **9**, 1905-21, 1999.
- 2) Huang, D., Jiang, X., Phelan, G. D., Londergan, T., Jen, A., Dalton, L., *Polymeric Materials and Science Engineering Preprints*, **83**, 266-267, 2000.
- 3) Jiang, X., Jen, A. K.-Y., Huang, D., Phelan, G. D., Londergan, T., Dalton, L., *Synthetic Metals*, **125**, 331 – 336, 2002.
- 4) Jiang, X., Phelan, G. D., Carlson, B., Liu, S., Dalton, L., Jen, A. K.-Y., *Macromolecular Symposia (2002)*, **186**(IUPAC 9th International Symposium on Macromolecule-Metal Complexes, 2001), 171-176, 2002.
- 5) Phelan, G. D., Jiang, X., Huang, D., Londergan, T., Jen, A. K.-Y., Dalton, L., *Thin Solid Films*, **416**(1-2), 212-217, 2002.
- 6) Phelan, G. D., Jiang, X., Carlson, B., Purvis, L. J., II, Jen, A. K.-Y., Dalton, L. R., *Polymeric Materials Science and Engineering*, **86**, 208-209, 2002.
- 7) Phelan, G. D., Carlson, B., Dalton, L., Jiang, X., Jen, A. K. Y., *Polymer Preprints*, **43**(2), 580-581, 2002.
- 8) Phelan, G. D., Carlson, B., Jiang, X., Jen, A. K. Y., Dalton, L. R., *Proc. of SPIE Nat. Meeting*, **4809**(Nanoscale Optics and Applications), 179-189, 2002.
- 9) Carlson B., Phelan G. D., Kaminsky W., Dalton L., Jiang X., Liu S., Jen A. K.-Y., *Journal of the American Chemical Society*, **124**(47), 14162-72, 2002.
- 10) Phelan, G. D., Carlson, B., Jiang, X., Jen, A. K. Y., Dalton, L. R., *Proc. of SPIE Nat. Meeting*, **4800**(Organic Light-Emitting Materials and Devices VI), 105-114, 2003.
- 11) Carlson, B., Phelan, G. D., Jiang, X., Kaminsky, W., Jen, A. K. Y., Dalton, L. R., *Proc. of SPIE-The International Society for Optical Engineering*, **4800**(Organic Light-Emitting Materials and Devices VI), 93-104, 2003.
- 12) Zelelow, B., Khalil, G., Phelan, G. D., Carlson, B., Gouterman, M., Callis, J., Dalton, L., *Sensor and Actuators*, **96**, 304-314, 2003.
- 13) Carlson, B., Phelan, G. D., Kim, J. H., Jen, A. K. -Y., Dalton, L., *Materials Research Society Symposium Proceedings*, **771**(Organic and Polymeric Materials and Devices), 363-368, 2003.
- 14) Khalil, G., Lau, K., Phelan, G. D., Carlson, B., Gouterman, M., Callis, J. B., Dalton, L. R., *Review of Scientific Instruments*, **75**(1), 192-206, 2004.
- 15) Phelan, G. D., Carlson, B., Lawson, R., Purvis, L., Allen, K., Rowe, D., Jiang, X., Jen, A. K. Y., Dalton, L. R., *Proc. of SPIE Nat. Meeting*, **5214**(Organic Light Emitting Materials and Devices VII), 337 – 347, 2004.
- 16) Carlson, B., Phelan, G. D., Kim, J. H., Jen, A. K. Y., Dalton, L. R., *Proc. of SPIE Nat. Meet.* **5214**(Organic Light Emitting Materials and Devices VII), 328 – 336, 2004.
- 17) Carlson, B., Phelan, G. D., Benedict, J., Kaminsky, W., Dalton, L., *Inorganica Chimica Acta*, **357**(13), 3967 – 3974, 2004.
- 18) Jiang, X., Phelan, G. D., Carlson, W., Jen, A. K.-Y., Dalton, L., *Synthetic Metals* (submitted)
- 19) “The design, syntheses, and characterization of divalent osmium complexes. Luminescence properties, crystallography, structure properties, and novel pressure sensitive paints with a fluoroacrylic polymer.” Carlson, B., Phelan, G. D., Benedict, J., Kaminsky, W., Khalil, G., Gouterman, M., Dalton, L., (Submitted)

CURRENT MANUSCRIPTS

- 1) "A crystallographic study of three partially fluorinated ligands showing a delocalized enolic structure" Phelan, G. D., Carlson, B., Benedict, J., Kaminsky, W., To be submitted to *Journal of Organic Chemistry* (in preparation)
- 2) "Metal complex containing polymeric based paints for use as sensors" Phelan, G. D., Carlson, B., Benedict, J., Kaminsky, W., To be submitted to Smart Coatings Conference
- 3) "Interpenetrating polymer networks containing transition metal complexes (working title)" Phelan, G. D., Carlson, B., To be submitted to *Advanced Materials*.
- 4) "A series of lanthanide complexes based on tris-chelated β -diketone ligands" Phelan, G. D., Carlson, B., To be submitted to *Inorganic Chemistry - Inorganica Chimica Acta*

PRESENTATIONS

- 1) American Chemical Society National Meeting, "Synthesis and characterization of europium complexes consisting of β -ketones of phenanthrene and pyridine" *Division of Inorganic Chemistry*, San Diego, 2005.
- 2) American Chemical Society National Meeting, "Implementation of a Personal Response Unit into the chemistry curriculum" *Division of Chemical Education*, San Diego, 2005.
- 3) Smart Coatings Meeting – 2005, "Pressure Sensing Paints Based on Fluoroacrylic Polymers Doped with Phosphorescent Divalent Osmium Complexes" Orlando, 2005.
- 4) American Chemical Society National Meeting, "Possible structural evidence for participation of phosphine (3d) and osmium (5d) orbital backbonding" *Division of Inorganic Chemistry*, Philadelphia, 2004.
- 5) American Chemical Society National Meeting, "Tunable emission in divalent osmium (II) complexes" *Division of Inorganic Chemistry*, New York, 2003.
- 6) American Chemical Society National Meeting, "Increased Efficiency in organic light emitting devices" *Division of Inorganic Chemistry*, New York, 2003.
- 7) Washington State Junior Science Competition, "The future of light looks bright" Seattle Pacific University, 2003.
- 8) Biennial Conference on Chemical Education, "Early Organic in a Quarter System", Bellingham, WA, 2002.
- 9) SPIE National Meeting, "Organic light emitting diodes incorporating nanometer thick films of europium cored complexes" *Nanoscale Optics and Applications*, 2002.
- 10) SPIE National Meeting, "Organic light-emitting diodes containing fluorinated asymmetrical europium cored beta-diketone complexes", *Organic Light Emitting Materials and Devices VI*, Seattle, 2002.
- 11) NORM Annual Meeting, "Synthesis and design of lanthanide cored complexes for use in organic light emitting diodes" June 2002.
- 12) University of Washington, "Nanoscale luminescent emission" Nanotechnology Seminar Series, Seattle, 2000.

CONFERENCE PAPERS

- 1) Phelan, G. D., Londergan, T., Huang, D., Dalton, L., *Div. of Orgn. Chem.*, 219th ACS National Meeting, San Francisco, 2000.
- 2) Phelan, G. D., Huang, D., Londergan, T., Dalton, L., Jiang, X., Jen, A. K.-Y., *Organic Chemistry*, Northwest / Rocky Mountain Regional Meeting, Idaho Falls, 2000.

- 3) Huang, D., Purvis, L., Phelan, G. D., Jiang, X., Jen, A. K.-Y., Dalton, L., *Div. of Orgn. Chem.*, 220th ACS National Meeting, Washington, DC, 2000.
- 4) Phelan, G. D., Maaref, S., Sharma, S., Frisch, H., *Macromolecules*, Fourth International Chemical Congress of Pacific Basin Societies, Honolulu, 2000.
- 5) Phelan, G. D., Purvis, L., Lee, D., Londergan, T., Huang, D., Dalton, L., *Div. of Orgn. Chem.*, 222nd ACS National Meeting, Chicago, 2001.
- 6) Phelan, G. D., Carlson, W., Jiang, X., Purvis, L., Lee, D., Jen, A. K.-Y., Dalton, L., *Div. of Orgn. Chem.*, 223rd ACS National Meeting, Orlando, 2002.
- 7) Phelan, G. D., *Div. of Chemical Education*, 223rd ACS Nat. Meeting, Orlando, 2002.
- 8) Khalil G., Phelan, G. D., Lau K. S., Carlson, B., Dalton, L., Gouterman, M., Callis, J., *Physical and Materials Chemistry*, Northwest Regional Meeting, 2002.
- 9) Phelan, G. D., Carlson, W., Jiang, X., Purvis, L., Jen, A., Dalton, L., *Div. of Orgn. Chem.*, 224th ACS National Meeting, Boston, 2002.
- 10) Phelan, G. D., Carlson, W., Fifield, L., Dalton, L., Pittcon, Orlando, 2003.
- 11) Phelan, G. D., *Div. of Chem. Educ.*, 224th ACS National Meeting, New Orleans, 2003.
- 12) Khalil G., Phelan, G. D., Lau K. S., Carlson, B., Dalton, L., Gouterman, M., Callis, J., *Div. of Industrial Chem.*, 224th ACS National Meeting, New Orleans, 2003.
- 13) Phelan, G. D., Carlson, W., Allen, K., Rowe, D., Dalton, L., Kim, J. K., Jen, A. K.-Y., *Organic Light Emitting Materials and Devices VII*, SPIE National Meeting, San Diego, 2003.
- 14) Carlson, W., Phelan, G. D., Dalton, L., Kim, J. K., Jen, A. K.-Y., *Organic Light Emitting Materials and Devices VII*, SPIE National Meeting, San Diego, 2003.
- 15) Phelan, G. D., Carlson, W., Allen, K., Rowe, D., Dalton, L., American Association for the Advancement of Science, National Meeting, Seattle, 2004.
- 16) Carlson, W., Phelan, G. D., Dalton, L., Kim, J. K., Jen, A. K.-Y., American Association for the Advancement of Science, National Meeting, Seattle, 2004.
- 17) Carlson, B., Phelan, G. D., Kaminsky, W., Dalton, L., *Div. of Inorganic Chemistry*, 226th ACS National Meeting, Anaheim, 2004.
- 18) Phelan, G. D., Carlson, W., Kaminsky, W., Dalton, L., *Div. of Inorganic Chemistry*, 226th ACS National Meeting, Anaheim, 2004.
- 19) Carlson, B., Phelan, G. D., Kaminsky, W., Dalton, L., *Div. of Inorganic Chemistry*, 227th ACS National Meeting, Philadelphia, 2004.

UNDERGRADUATE RESEARCH ASSISTANT CONFERENCE PAPERS

- 1) Purvis, L., Phelan, G. D., Dalton, L., Division of Undergraduate Education, 223rd ACS National Meeting, Orlando, 2002.
- 2) Purvis, L., Phelan, G. D., Lee, D., Dalton, L., *Organic Chemistry*, Northwest Regional Meeting, Seattle, 2001.
- 3) Lee, D., Phelan, G. D., Purvis, L., Dalton, L., *Organic Chemistry*, Northwest Regional Meeting, Seattle, 2001.
- 4) Purvis, L., Phelan, G. D., Carlson, W., Dalton, L., *Div. of Undergrad. Educ.*, Northwest Regional Meeting, Spokane, 2002.
- 5) Purvis, L., Phelan, G. D., Carlson, W., Dalton, L., *Div. of Undergrad. Educ.*, 224th ACS National Meeting, New Orleans, 2003.
- 6) Purvis, L., Phelan, G. D., Carlson, W., Dalton, L., *Div. of Chem. Educ.*, 224th ACS National Meeting, New Orleans, 2003.
- 7) Allen, K., Carlson, W., Phelan, G. D., Puget Sound Section of the American Chemical Society Undergraduate Res. Conf., Seattle University, 2003
- 8) Rowe, D., Carlson, W., Phelan, G. D., American Association for the Advancement of Science, National Meeting, Seattle, 2004

- 9) Allen, K., Carlson, W., Phelan, G. D., *Div. of Chem. Educ.*, 226th ACS National Meeting, Anaheim, 2004
- 10) Rowe, D., Carlson, W., Phelan, G. D., *Div. of Chem. Educ.*, 226th ACS National Meeting, Anaheim, 2004

PROFESSIONAL EXPERIENCE

Affiliate Assistant Professor

2004 -

Department of Chemistry - University of Washington

I am working as a faculty member of the Department of Chemistry researching materials science in the areas of luminescent materials, metal complexes, sensing materials, polymer chemistry, and the manufacture of organic light emitting devices - electrochemical cells, and the application of these devices for use as sensors. I am participating in the National Science Foundation Materials and Devices for Information Technology Research Science and Technology Center as a Research Scientist. I am currently helping direct the research of a team of undergraduate students, graduate students and post-docs within the MDITR center.

Assistant Professor

2000 -

Department of Chemistry and Biochemistry - Seattle Pacific University

Teach Chemistry courses for majors and non-majors including general chemistry, physical chemistry, thermodynamics, physical chemistry lab, introductory organic chemistry, introductory biochemistry, and quantitative analysis class. Introduced program to broaden undergraduate educational experience by including community outreach to elementary schools. Began a program to bring technologies into the classroom and laboratories including the use of a Personal Response System, the use of automated sensors in laboratory, and the use of mathematical software, Maple and Mathematica, into the chemistry curriculum. Am leading the effort to redesign the curriculum for a Bachelors in Science degree. Chaired and co-chaired committees on ACS accreditation, building space, intellectual property, and building liabilities.

Consultant

2003

Isotron Incorporated

Worked as a consultant/chemist with Isotron Incorporated, a chemistry company specializing in polymeric coatings. Contributed intellectual property to two patents. Helped write grants securing SBIR and TSWIG contracts of more than \$3 million.

Fellow - Mathematics Specialist

2001-2003

Department of Applied Mathematics - University of Washington

National Science Foundation GK – 12 Program

Worked with elementary school teachers at Thurgood Marshall Public Elementary School in Seattle to develop and implement new mathematics curriculum dealing with inquiry based learning. Taught Math and Science to Second, Fourth, and Fifth grade classes. Helped improve math scores on the WASL from 0-11% to 55% passing. Created and maintained webpage and presentation materials. <http://www.amath.washington.edu/~adams/gk12/>

Science Specialist/Consultant

2002

The Villa Academy, Seattle, WA

Worked with elementary school teachers at a private parochial elementary school in Seattle to develop and implement a new science curriculum dealing with inquiry based science activities. Created and supervised in-service teacher training activities.

Part-time Instructor **1999 - 2001**
Bellevue Community College

Taught various chemistry classes including Chemistry I for majors, Introductory General Chemistry for Non-Majors, and Introductory Organic Chemistry for Non-Majors. Responsible for lecture and laboratory supervision.

Part-time Instructor **2000**
North Seattle Community College

Taught Introductory Chemistry for Non-Majors. Responsible for lecture and laboratory.

Part-time Instructor **1999**
Green River Community College

Taught General Chemistry III for Majors. Responsible for lecture and laboratory.

University Facilitator **1997-1998**
Department of Academic Support Services - University of Albany

Ran extra-help classes for freshman General Chemistry 1 and 2 for majors and non-majors (semester system). Supervised undergraduate tutors.

OTHER ACTIVITIES – PROFESSIONAL DEVELOPMENT

- 2003 Puget Sound Section of the American Chemical Society –**
Spring Undergraduate Research Conference Conference Chair
- 2004 The Photonics Group**
Member University of Washington
- 2003 Materials and Devices for Information Technology Research Educational**
Advisory Board University of Washington
- 2004 Open Learning Initiative Summer Faculty Workshop**
Attendee Carnegie Mellon University
- 2004 “Preparing Future Chemical Leaders of Tomorrow”**
Panelist University of Washington and the Dreyfus Foundation
- 2004 “Higher Education in America: Different Careers in Academia”**
Panelist Sponsored by the University of Washington
- 2004 MID Conference Innovations in Chemical Education**
Attendee Portland Community College
- 2003 Gordon Conference: Science Education and Visualization: International**
Invited Presenter Queens College, Oxford, England
- 2001 Gordon Conference: Science Education and Visualization: International**
Invited Presenter Mount Holyoke College
- 2001 “Adopting Inquiry Based Laboratory Exercises into General Chemistry”**
Attendee University of Illinois at Chicago
- 2001 “Physics by Inquiry” Faculty Training, Physics Education Group,**
Attendee University of Washington
- 2001 Workshop: Native American Cultures and the Process of Learning**
Attendee Everett Community College
- 2000 Workshop: Improving the Quality of Undergraduate Education**
Attendee North Seattle Community College