

Peter E. Chen

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Columbia University – Department of Chemistry
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EDUCATION

COLUMBIA UNIVERSITY, PhD, M. PHIL, M.A.

New York, NY

Chemistry

PhD expected Aug. '17

PhD Advisor: Prof. Jonathan S. Owen

The effects of nanoparticle surfaces on acid-base chemistry: control of neutral and ionic ligand composition on cadmium selenide colloids and thin-films

BOSTON UNIVERSITY, B.A.

Boston, MA

Chemistry, Minor in Mathematics, *Cum Laude*

2008-2012

Undergraduate advisor: Prof. Linda H. Doerr

Early First Row Transition Metals with Fluorinated Alkoxide Ligands, and Density Functional Theory Calculations on $[(Ph_3P)Cu(\square-OR)_2(PPh_3)]$ Dimers

AWARDS & HONORS

Columbia Technology Ventures Fellowship Recipient 2014-2017

National Science Foundation Graduate Research Fellowship Recipient 2013

- Provided \$130k in individual funding (<10% of applicants recognized)

American Chemical Society Undergraduate Research Award in Inorganic Chemistry 2012

- Awarded to the university's top graduating student (out of 50) in this subdivision of chemistry

Undergraduate Research Opportunities Program Funding Awardee 2011

Boston University Dean's List (GPA \geq 3.5/4.0) 2009-2011

National Honor Society Member 2007

PUBLICATIONS AND MANUSCRIPTS IN PREPARATION

Chen, Peter E.; Anderson, Nicholas C.; Norman, Zachariah M.; Owen, Jonathan S. "Balancing Charge in Cadmium Carboxylate, Ammonium Carboxylate, and Amine Bound Cadmium Selenide Nanocrystals." *J. Am. Chem. Soc. ASAP*.

Chen, Peter E.; McNeely, James; Lum, June S.; Gardner, Evan J.; Phillips, Val; Golen, James A.; Rheingold, Arnold L.; Doerr, Linda H. "LCu(μ -X)₂CuL Compounds: An Induced Cuprophilic Interaction." *Polyhedron*, **2016**, 116, 204-215.

Lum, June S.; **Chen, Peter E.**; Rheingold, Arnold L.; and Doerr, Linda H. "Zinc(II) Complexes with Fluorinated Monodentate Aryloxy and Alkoxide Ligands." *Polyhedron*, **2013**, 58, 218-228.

Chen, Peter E. "Early First Row Transition Metals with Fluorinated Alkoxide Ligands and Density Functional Theory Calculations on [LCu(μ -X)₂CuL] Dimers." **2012**, Senior Research Thesis.

Conklin, Sean D. and **Chen, Peter E.** "Quantification of four arsenic species in fruit juices by ion-chromatography-inductively coupled plasma-mass spectrometry." *Food Additives & Contaminants: Part A*, **2012**, 29, 8, 1272-1279.

Chen, Peter E.; Greenburg, Matthew; Norman, Zachariah M.; Anderson, Nicholas C.; Terban, Maxwell; Billinge, Simon; Owen, Jonathan S. "

Anderson, Nicholas C.; **Chen, Peter E.**; Owen, Jonathan S. "Binding Affinity of Lewis Bases on Cadmium Selenide Nanocrystals." *In Preparation*.

RESEARCH EXPERIENCE

COLUMBIA UNIVERSITY

New York, NY

Inorganic Materials Chemistry – Advisor: Jonathan S. Owen

2012 - Present

- Investigating the dynamics of ligand exchange on the surface of II-VI semiconductor nanocrystals and its effect on the material's optical and electronic properties.

- Monitored the formation of and spectroscopically characterized ammonium ion-pairs on cadmium selenide nanocrystal surfaces and demonstrated their influence on device performance.
- Synthesized and characterized a model cadmium selenide nanocrystal material to investigate the fundamental surface chemistry of stoichiometric semiconductor nanocrystals.
- Using pair distribution function (PDF) analysis to study the effect of nanocrystal surface composition on thin film structure. Fabricated transistors with these nanocrystal samples to correlate structural changes to device performance.
- Using solid state NMR spectroscopy to investigate the alloying of core-shell nanocrystals.
- Using scanning tunneling microscopy (STM) to study the electronic coupling of cadmium selenide nanocrystal monolayers.

Boston University

Boston, MA

Inorganic Synthesis – Advisor: Prof. Linda H. Doerrer

2010-2012

- Synthesized and characterized first row metal complexes with fluorinated tris-alkoxide ligand frameworks for applications in C-H activation.
- Synthesized and performed density functional theory (DFT) calculations on [LCu(μ -X)₂CuL] dimers to investigate the structural and electronic effects on metallophilic interactions in these systems.

Food and Drug Administration (FDA)

College Park, MD

Analytical Methodology – Advisor: Dr. Sean D. Conklin

2009

- Developed an HPLC/ICP-MS method to quantify hazardous arsenic levels in juice products.

PRESENTATIONS

Chen, Peter E. “The Effects of Alkylation on Cadmium Selenide Nanocrystals.” Talk. American Chemical Society National Meeting, San Diego, CA, March, 2016.

Chen, Peter E. “Alkylation of Cadmium Selenide Nanocrystals with Dimethylcadmium and Diethylzinc.” Talk. Friday Synthesis Symposium, Columbia University, March, 2016.

Chen, Peter E. “Stoichiometric II-VI Nanocrystals Using Z-Type Displacement Chemistry.” Talk. American Chemical Society National Meeting, Denver, CO, March, 2015.

Beecher, A. N.; **Chen, Peter E.**; Juhas, P.; Norman, Z. M.; Jensen, K. M. Ø.; Billinge, S. J.; Owen, J. S. “Probing structure-property relationships at the nanoscale: Combined X-ray and spectroscopic methods for the study of colloidal cadmium selenide.” Poster. American Chemical Society National Meeting, Denver, CO, March, 2015.

Chen, Peter E. “Nanocrystals Week II: True Beauty Lies on the Outside – the Surface Chemistry of Nanoparticles.” Talk. Moments in Materials Seminar Series, Columbia University, NY, August, 2014.

Chen, Peter E. “Early First Row Transition Metals with Fluorinated Alkoxide Ligands, and Density Functional Theory Calculations on [(Ph₃P)Cu(\square -OR)₂(PPh₃)] Dimers.” Talk. Undergraduate Independent Work for Distinction Symposium, Boston University, MA, May, 2012.

Chen, Peter E. “Synthesis and Reactivity of Chromium Tris-Perfluorotertbutoxide and DFT Calculations of [Cu(OR^t)(PPh₃)₂] Dimers.” Poster. Undergraduate Research Outreach Program Symposium, Boston University, MA, 2011.

MENTORSHIP, TEACHING, AND OUTREACH EXPERIENCE

MENTOR

New York, NY

One undergraduate student

2016 - Present

- Training and guiding an undergraduate student in studying the effects of surface chemistry on nanoparticle monolayer formation.

TEACHING ASSISTANT

New York, NY

General Chemistry I – Prof. Gerard Parkin

2013

- Conducted weekly recitation sessions, organized review sessions, wrote and graded quizzes/exams for 2 classes of 30 students.

Intensive General Chemistry Lab – Dr. Luis Avila

2013

- Developed a lab curriculum for advanced chemistry-oriented undergraduates, ran laboratory sessions, mentored groups of undergraduates in planning and executing capstone projects, graded lab reports for 2 classes of 20 students.

General Chemistry Lab – Dr. Sarah Hansen, Mr. Joseph Ulichny

2012

- Ran laboratory sessions, mentored undergraduates in scientific writing, graded lab reports and quizzes for 2 classes of 25 students.

OUTREACH

New York, NY

Girls Science Day

2012-2016

- Served as an experiment leader for an outreach program for young women in the NYC area. Ran experiments (solar cells, hydrophilicity, gold and silver nanoparticle synthesis) with groups of 20 female middle school students.

TAG Young Scholar's Middle School

2013

- Worked with two classes of 30 middle school students to teach them the concepts of dye-sensitized solar cells, through a short lecture and a hands-on experiment in making solar cells from the dye of raspberries.

ADDITIONAL PROFESSIONAL EXPERIENCE

COLUMBIA TECHNOLOGY VENTURES

New York, NY

Fellow

2014-2016

- Evaluated the commercial potential and advantages of over 150 technologies developed by Columbia University researchers.
- Developed marketing schemes and identifying contacts at relevant companies to facilitate licensing of technologies, which helped initiate negotiations with companies for 60% of active projects in 2015.
- Conducted market research and intellectual property prior art analysis.
- Technological areas included alternative energy, nanotechnology, 2D semiconductors, biotechnology, pharmaceuticals, information technology, and computer algorithms.

DEPARTMENTAL COMMITTEES SERVED

COLUMBIA CHEMISTRY SOCIAL COMMITTEE

New York, NY

Co-chair

2013-2014

- Organized monthly and annual events for 250 people to foster departmental and inter-departmental community between students and faculty; increased the annual budget for events by 4%.

MOMENTS IN MATERIALS SEMINAR SERIES

New York, NY

Co-founder and Co-chair

2013-2014

- Coordinated 20 weekly research symposia for students and invited scientists; negotiated \$500 in annual funding for these seminars with the chemistry department.

PROFESSIONAL AFFILIATIONS

American Chemical Society

2014-present

TECHNICAL SKILLS

Instrument/Laboratory experience: NMR (1-D and 2-D methods); Absorbance/photoluminescence spectroscopies; TEM; SEM; HPLC; ICP-MS; Tunneling microscopy; SCXRD; air-sensitive synthesis; high-pressure and high-temperature reactions; use of pyrophoric and highly toxic organometallic chemicals

Software proficiency: ChemDraw; Igor; Microsoft Office; DFT; Adobe Creative Cloud software; MestReNova; TopSpin; Python (basic), C++ (basic)

Languages: English (native), Spanish (conversational)

ADDITIONAL INTERESTS

Endurance runner – marathons and 50+ mile trail runs • Rock climbing • Triathlete – competed in 2012 collegiate national championship • Open water swimmer • Homebrewing – host annual holiday parties with 150 L of homebrew beer • Live music – may have attended a Cranberries reunion show in 2010