

Natalia Kozlyuk

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EDUCATION

University of California, Irvine, CA May 2017
Ph.D. in Chemistry
Research Advisor: Prof. Rachel Martin

University of Redlands, Redlands, CA May 2012
B.S. in Biochemistry GPA: 3.60
Research Advisor: Prof. Henry Acquaye

LAB SKILLS

DNA cloning/PCR, protein expression and purification (isotopically labeled and unlabeled), protein and DNA gel electrophoresis, fast protein liquid chromatography (affinity, ion exchange, size exclusion), fluorescence spectroscopy, circular dichroism, dynamic light scattering, UV/Vis spectroscopy, nuclear magnetic resonance including SAR by NMR, HNCO, HNCA, HCCH-COSY, and dipolar coupling measurements, isothermal titration calorimetry, X-ray crystallography

COMPUTER SKILLS

Microsoft Office, Mathematica, Linux, LaTeX, PyMOL, CcpNMR, NMRDraw, Sparky, ChemDraw

RESEARCH EXPERIENCE

May, 2017- Present Vanderbilt University Nashville, TN

Structural and Chemical Biology with Prof. Walter Chazin

- Designing small molecule protein inhibitor using SAR by NMR
- X-ray crystal structure determination of protein with fragments

January, 2013-May 2017 University of California, Irvine Irvine, CA

Structural Biology with Prof. Rachel Martin

- Biophysically characterized a Ca²⁺ binding protein from a tunicate species
- Optimizing bicelle mixture alignment at low temperature for nucleic acid and protein structure determination using solution-state NMR
- Structure determination of proteins using optimized bicelle mixture and solution-state NMR in the presence of divalent metal ions
- Developed a method for determining concentrations of divalent metal ions bound to biomolecules *in situ* using ³¹P NMR

June, 2012-August 2012 Loma Linda University School of Pharmacy Loma Linda, CA

Organic Synthesis with Prof. David Weldon

- Medicinal Chemistry Summer Research Program
- Synthesized the first intermediate in an eight step route to Kalanchosine, a natural product
- Practiced TLC plating techniques in checking the progress of numerous reactions and learned to set up reactions in oxygen-free environments

June, 2010-May 2012 University of Redlands Chemistry Department Redlands, CA

Bio-inorganic Chemistry with Prof. Henry Acquaye

- Synthesized metal complexes using copper and vanadium compounds
- Characterized the complexes by IR spec, UV/VIS spec, cyclic voltammetry and elemental analysis
- Tested the reactivity of the metal complexes with DNA and grew crystals of metal complexes for X-ray crystal structure determination

May, 2009-June, 2009 University of Redlands Chemistry Department Redlands, CA

Biochemistry with Prof. Daniel Wacks

- Crossed an *Escherichia coli* strain with a *Sinorhizobium meliloti* strain and grew their offspring on minimal plates with galactose as the carbon source
- Replica plated the *Sinorhizobium meliloti* mutants from the galactose plates to plates that had glucose as the carbon source and searched for *Sinorhizobium meliloti* glucose-minus mutants

June, 2007-August, 2007 Polymer Chemistry Lab at Dartmouth College Hanover, NH

Volunteer

- Shadowed a graduate student in helping with synthesis of organic compounds

WORK EXPERIENCE

September 2012-Present University of California, Irvine Irvine, CA

Teaching Assistant

- Teaching high school students a chemical biology summer program with plant pigment extractions, streaking bacteria onto agar plates, designing independent research projects
- Teaching students general chemistry and organic chemistry labs with weekly experiments including synthesis of various compounds, filtration techniques, extractions, TLC plating, melting point determination
- Leading discussion sections for a majors general chemistry class/analytical chemistry
- Holding office hours and review sessions in helping students with questions
- Grading lab reports, practicals, quizzes and exams
- Proctoring general chemistry and organic chemistry exams

September, 2009-May 2012 University of Redlands Chemistry and Biology Department Redlands, CA

Stock Room Assistant

- Set up labs, prepared solutions, organized chemicals, washed dishes

PUBLICATIONS

1. "Synthesis and the Characterization of Schiff-base Copper Complexes: Reactivity with DNA, 4-NPP and BNPP." **Kozlyuk, N.**; Lopez, T.; Roth, P.; Acquaye, J. H. *Inorg. Chem. Acta* **2015**, *428*, 176-184.
2. "In Situ NMR Measurement of Macromolecule-molecule Bound Metal Ion Concentration." **Kozlyuk, N.**; Sengupta, S.; Luptak, A.; Martin, R. W. *J. Biomol. NMR* **2016**, *64*, 269-273.
3. "Calcium Binding Dramatically Stabilizes an Ancestral Crystallin Fold in Tunicate $\beta\gamma$ -Crystallin." **Kozlyuk, N.**; Sengupta, S.; Bierma, J.; Martin, R. W. *Biochemistry* **2016**, *55*, 6961-6968.
4. "Cyclizing Pentapeptides: Mechanism and Application of Dehydrophenylalanine as a Traceless Turn-Inducer." Le, N. D.; Riedel, J., **Kozlyuk, N.**; Martin, R. W.; Dong, V. M. *Org. Lett.* **2016**, *19*, 114-117.
5. "Refractive Index Increment (dn/dC) of Various Eye Lens Crystallins. Khago, D.; Bierma, J. C.; Roskamp, K. W.; **Kozlyuk, N.**; Martin, R. W. *In preparation*.

PRESENTATIONS

Oral Presentations:

1. "Calcium Binding Stabilizes an Ancestral Crystallin Fold in Tunicate $\beta\gamma$ -Crystallin." 251st American Chemical Society National Meeting and Exposition, March 2016
2. "Exploring the Interactions of Divalent Cations with Bicelle Mixtures and Biomolecules." University of Redlands Chemistry Seminar, November 2015
3. "NMR Studies of DNA Aligned in DMPC/DHPC/CS Bicelle Mixtures." Inter-Continental Advanced Materials for Photonics Summer School in Cambridge, England, June-July 2013
4. "Syntheses and the Characterization of Schiff-Base Copper Complexes: Reactivity with BNPP and DNA." Southern California Conference for Undergraduate Research, November 2011

Poster Presentations:

1. "Investigating the Structural and Metal Binding Properties of an Ancestral Eye Lens Crystallin." Experimental Nuclear Magnetic Resonance Conference and American Chemical Society National Meeting and Exposition, March-April 2017

2. “*In Situ* Determination of Free [Mg²⁺] and [Ca²⁺] in Biomolecular NMR Samples Using an Internal dCDP Standard.” Experimental Nuclear Magnetic Resonance Conference, April 2015
3. “NMR Studies of DNA Aligned in DMPC/DHPC/CS Bicelle Mixtures.” Inter-Continental Advanced Materials for Photonics Summer School in Cambridge, England, June-July 2013
4. “Synthesis and the Crystal Structures of Schiff-Base Copper Complexes: Hydrolysis of Phosphodiester Bonds.” Southern California Conference for Undergraduate Research, November 2010

HONORS AND ACTIVITIES

Recipient of the Graduate Award for Departmental Service at UC Irvine	June 2016
Participant at a Cell-free Protein Synthesis Workshop at University of Gothenburg, Sweden	October 2014
Student Employee of the Year Award at University of Redlands	May 2012
Winner of the ACS Analytical Chemistry Award	May 2011
Nominee for the Barry Goldwater Scholarship at University of Redlands	November 2010
Member of the Chemistry Faculty Search Committee at University of Redlands	September-December 2010
Member of the American Chemical Society	August 2010-Present
Athlete of University of Redlands Track and Field Team	October 2009-May 2012
President of the University of Redlands Chemistry Club	February 2009-May 2012
University of Redlands Dean’s List	January 2009-May 2012
Presidential Scholarship at the University of Redlands	August 2008-May 2012
Achievement Award at the University of Redlands	August 2008- May 2012