# ILIKE CHEMISTRY

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## EDUCATION

**Carnegie Mellon University** (CMU) **Pittsburgh, PA**
Bachelor of Science in Chemistry, Minor in Computer Science **May 2016**
Cumulative GPA: 3.5 Major GPA: 4.0

## RELEVANT COURSEWORK

Modern Organic Chemistry I & II
Modern Analytical Instrumentation
Mathematical Method for Chemists
Fundamentals of Programming & Computer Science
Molecular Design & Synthesis
Principles of Software System Construction

## ACADEMIC PROJECTS

**Ethoxyquin and Fat in Pet Food** **Fall 2014**

- Team project on quantitative analysis of fat preservative ethoxyquin in pet food and fat, and inquiry on relationship between the amount of ethoxyquin and fat

**Structural Chemistry Simulator** **Spring 2013**

- Wrote a program in python to assist students visualize 3D molecular structures
- Project video: http://www.youtube.com/watch?v=dTYK-KcCLGM

## TECHNICAL SKILLS

**Computer and Programming:** Proficient programming in Python and Java; basic knowledge of C; Microsoft office
**Laboratory:** Column chromatography, high performance liquid chromatography (HPLC), infrared spectroscopy (IR), nuclear magnetic resonance (NMR) spectrum, ultraviolet and visible spectrophotometry, matrix-assisted laser desorption/ionization mass spectrometry (MALDI)

## RESEARCH EXPERIENCE

**Institute of Organic Chemistry**, Friedrich-Schiller University **May 2014 – August 2014**

- Worked on improving anti-tuberculosis activity of pyridomycin by synthesizing 3-hydroxy pyridine derivatives with cross coupling reactions

**Bioorganic Chemistry Lab**, Carnegie Mellon University **January 2013 – May 2014**

- Target unstable expansion repeat by native chemical ligation (NCL) of peptide nucleic acid (PNA)
- MALDI and melting point measurement of NCL reaction results
- Multi-step synthesis and purification of PNA monomers

## WORK EXPERIENCE

**Fundamentals of Programming and Computer Science**, CMU **Pittsburgh, PA**
**Course Assistant** **September 2013 – Present**

- Plan and teach weekly recitations to supplement lectures
- Lead course-wide homework preparation and exam review sessions
- Hold office hours to guide students in problem solving
- Lead tutoring sessions for both individuals and groups
- Mentor students through individual final term projects

## HONORS

Research Internship in Science and Engineering (RISE) Scholar
HHMI Fellowship for Summer Researcher

# Chemistry Graduate

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## EDUCATION

**Ph.D. Chemistry, Carnegie Mellon University, Pittsburgh, PA, May 2015**

- G.P.A. 3.98
- Dissertation: Investigating the biological implications of guanine-quadruplex recognition by peptide nucleic acid oligomers
- Thesis Advisor: Prof. Bruce Armitage

**B.Sc. Chemistry, Morgan State University, Baltimore, MD, May 2011**

- G.P.A. 3.97
- Thesis: Microwave-assisted synthesis and photo-physical characterization of cyanine dyes for imaging of live cells
- Thesis Advisor: Prof. Angela Winstead

## RESEARCH EXPERIENCE

**Ph.D. Candidate/Research Assistant, Carnegie Mellon University, September 2011 – Present**

- Designed and synthesized novel peptide nucleic acid ligands that bind to DNA/RNA targets with exceptional affinity. This work is currently being funded by a successful grant application ($3.1 million) to the David Scaife Family (DSF) charitable foundation.
- Developed the first enzyme reporter assays that demonstrate the biological activities of peptide nucleic acids, which are novel DNA-binding compounds. This technique is now widely used by my colleagues to probe for biological functions of active DNA/RNA ligands.
- Characterized novel ligand-protein complexes that can be used for imaging components of live cells.
- Implemented an automated method for peptide synthesis that is now widely used by my colleagues to obtain novel peptide nucleic acid molecules.
- Developed several novel spectroscopic methods for characterizing molecular interactions. These methods are now routinely used by my colleagues within the center for nucleic acid science at Carnegie Mellon University.

**Research Student, NSF-RISE, September 2007 – May 2011**

- Developed a novel method for synthesizing cyanine dyes using microwave heating systems in the lab of Prof. Angela Winstead at Morgan State University. Results from this study were vital in securing $500,000 in grant funding from the Department of Defense.
- Optimized the synthesis of precursors to peptide mimics in the lab of Prof. Kevin Burgess at Texas A&M University. Results from this work improved overall yield of the compounds by 80% and contributed to a grant application to the National Institutes of Health.
- Designed and synthesized cyanine dyes for monitoring biological processes in living cells in the lab of Prof. Bruce Armitage at Carnegie Mellon University.

## LEADERSHIP EXPERIENCE

**Professional Organizations**

- Pittsburgh student chapter, National Organization for the professional advancement of Black Chemists and Chemical Engineers (NOBCChE), Co-President
- National Society of Black Engineers, Member
- American Chemical Society, Member
- Golden Key International Honors Society, Member

**Mentoring Activities**

- Initiated, planned, and directed execution of science outreach demos to serve children in underserved communities.
- Mentored both an undergraduate and a graduate student towards completion of a summer research project and Master's degree, respectively.
- Volunteered with science outreach organization (DNAZone) to plan and present science demos in order to foster science interest among kids in Pittsburgh's high schools.
- Participated as one of the mentors in a vacation Bible school organized for children in elementary and middle schools.
- Served as the vice-president of a Young Adults' ministry that provides spiritual and emotional support to college students in all colleges in Pittsburgh.

## SELECTED PUBLICATIONS

- Winstead, A., Nyambura, G., Matthews, R., Toney, D., **Graduate, C.,** Synthesis of Quaternary Heterocyclic Salts, Molecules, 2013, 18, 14306 - 14319.
- Winstead, A., **Graduate, C.,** 1-(6-methoxy-6-oxohexyl)-4-methylquinolinium iodide, Molbank, 2010, M647.
- Winstead, A., Williams, R., Zhang, Y., Mclean, C., **Graduate, C.,** Microwave Synthesis of Cyanine Dyes, J. Microwave Power and Electromagnetic Energy, 2010, 44, 207-212.

## AWARDS AND ACKNOWLEDGMENTS

- Dr. Julius A. Vida S 1960, '61 Fellowship in Chemistry (Carnegie Mellon), 2011
- Outstanding Academic Male of the Year (Morgan State University), 2011
- Award for Excellence in Chemistry (Morgan State University), 2011
- Organic Chemistry Award (Morgan State University), 2011
- Colgate Palmolive Undergraduate Chemical Engineering Award, 2010
- National Society of Black Engineers BCA scholar, 2009
- 'Honorable Mention' winner for poster presentation at annual NOBCChE Conference, 2009
- 2nd place winner for poster presentation at annual Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) research conference, 2009
- 3rd place winner for poster presentation at HBCU-UP research conference, 2008
- Morgan State University Full Academic Scholarship Recipient, 2008-2011