Ariana Abayomi '16  From: Atlanta, GA
Advisor: Rebecca Whelan
Project: Developing an Analytical Chemistry Lab: Weak Acid Titrations and their analysis via graphical and qualitative methods
Description: I am redeveloping an existing analytical chemistry lab experiment (Determination of Weak Acid Concentration and Ka by Titration and Graphical Data Analysis) for Professor Whelan. The main goal of this project is to identify a more applicable acid analyte to be utilized in one of course’s experiments. The following characteristics will be used to gather admissible candidate acids: weak acidity, organic classification, water solubility, and attainability in a solid form (monoprotic acids are preferable). In addition, procedures of the experiment will be reviewed, as well as the representation of resulting data via several graphical and qualitative means, including color indicator tests, titration curves, first and second derivative graphs, and Gran plots.
Other Interests: Varsity Tennis, Cinema Studies, Community Service: Du Bois Math Club.

Eric Bell ’14  From: Hamilton, OH
Advisor: Jesse Rowsell
Project: Software Development for 3D-Printing of Molecular Models
Description: I am writing a program that will bridge the gap between analysis software used by chemists to view crystal structures and modeling software used by engineers for rapid-prototyping of solid objects. We plan to use this interface to build accurate molecular models using Oberlin's new 3D printing facility. We are exploring the following strategies: development of a plugin for the modeling programs to open crystallography files, development of a plugin for the crystallography program to export modeling files, and creating a new interface that performs both tasks.
Other Interests: Playing horn, video games, and music production.
Lauren Choban '16  From: Westlake, OH

Advisor: Jason Belitsky

Project: Colorimetric Metal Ion Binding Coatings

Description: Our lab focuses on melanins, ubiquitous but poorly understood biological pigments, and related synthetic materials. Melanins and synthetic analogs have fascinating chemical properties that can be exploited for environmental applications including the binding and sensing of heavy metals and organic pollutants. We recently found a class of synthetic coatings that change color upon binding lead and other metal ions. This Winter Term we are exploring the chemical nature of these coatings, in order to understand their colorimetric properties and develop improved sensors for lead.

Other Interests: Swimming, reading and baking.

Chris Eckdahl '17  From: St. Joseph, Missouri.

Advisor: Jesse Rowsell

Project: Lab Development for Inorganic Chemistry

Description: My Winter Term project consists mainly of improving Inorganic Chemistry teaching labs. This involves troubleshooting labs multiple times, finding errors in the procedures, and adding new processes. Another part of my project involves the investigation of crystals formed from metal-methanol complexes. In these reactions I dissolve various sulfate salts in methanol in hopes of finding crystal formations after a few days. I then observe these crystals under a microscope and analyze their structure using X-ray diffraction. The goal of this work is a thorough understanding of the crystallization process in order to incorporate it as a new teaching lab for the course.

Other Interests: I like to read about Physics or Philosophy, play trumpet or mandolin, or relax with friends.
Natasha Eklund '16 From: Grosse Pointe Woods, MI
Advisor: Robert Thompson
Project: Determination of Drugs of Abuse in Blood
Description: The Thompson lab is developing teaching experiments for the instrumental analysis course that are adapted from analyses performed routinely in forensic laboratories. One example is the determination of drugs of abuse in blood. Our particular focus will be on several common street drugs -- cocaine, heroin, and amphetamines -- in "synthetic blood", a water solution of egg white, table salt, and added colored material. The drug or metabolite must first be isolated from the rest of the blood matrix by protein precipitation and then solid phase extraction. The compounds are identified and quantified by liquid chromatography – mass spectrometry or gas chromatography – mass spectrometry. We will determine the optimal precipitation, extraction, chromatography, and mass spectrometry conditions for the analysis. The study should result in a robust procedure for the both the instructor who will set up the experiment and the students who will attempt to finger the guilty party.

Other Interests: I love baking and cooking, both for fun and for Keep co-op. I also love reading just about anything when I have time.

Aidan Estelle '17 From: San Diego, CA
Advisor: Robert Thompson
Project: Determination of Ethanol in Blood
Description: A procedure that can be used in analytical chemistry courses for measuring the amount of ethanol in simulated blood was developed and optimized. Ethanol was determined by headspace sampling, followed by gas chromatography. The results from a literature method and from our method were compared in terms of sensitivity, accuracy, and precision. The method is also useful for determining the ethanol content of alcoholic beverages.

Other Interests: I have an interest in art history and music.
Zoe Feder '16  From: Manitowoc, WI
Advisor: Jesse Rowsell
Project: 3D-Printing of Molecular Models
Description: I am working collaboratively to develop a simplified process for students and faculty to create molecular models using Oberlin's new 3D printing facility. Molecular models play an integral role in the learning process for many students and can also aid in solving research problems. We hope to make these tools more accessible to users having limited or zero prior experience with 3D printing. We are currently printing in polylactic acid, a biodegradable polyester derived from fermented corn dextrose. My project is focused on post-processing: modifying the models in order to improve their appearance and correct for distortions that arise from limitations of the printing process.

Aaron Frederick '15  From: McLean, VA
Advisor: Jesse Rowsell
Project: Software Development for 3D-Printing of Molecular Models
Description: I am currently working on a computer program that will enable chemists to "print" molecular models using a 3D printer. I am learning Python, a widely used programming language, to build an interface that will convert atomic coordinate files into input files for the printer. The goal is to make the process easy for chemistry students and faculty to use in their coursework and research. We hope to satisfy our own curiosity about how molecules pack together in crystals, and help others see things that a 2D display cannot show.
Andrea Goltz ‘17 From: Belle Harbor, NY
Advisor: Catherine Oertel

Project: Synthesis and Characterization of Inorganic Pigments

Description: Inorganic materials are frequently colored, leading to their historic and current use as pigments. We are using a variety of methods, including hydrothermal synthesis, simple precipitation, and high-temperature solid state synthesis, to prepare samples of materials that have been utilized as artists’ pigments. We are also synthesizing materials that have recently been discovered as robust and less toxic alternatives to historic pigments. Samples will be characterized using powder X-ray diffraction, scanning electron microscopy, and diffuse reflectance UV-Vis spectroscopy. Methods developed and tested through this project will be used in laboratory activities in FYSP 053, Materials at the Museum, in Spring 2014.

Adam Hammer ‘17 From: Thousand Oaks, CA
Advisor: Matt Elrod

Project: The Potential Catalytic Role of Ammonium Ion in Epoxide Reactions Occurring on Secondary Organic Aerosol

Description: The reactions of gas phase epoxide intermediates are known to play an important role in secondary organic aerosol (SOA) formation, and are thus linked to the issues of air pollution and global climate change. Previous work has shown that acid catalysis is a means for the efficient reactions of epoxides on SOA. Recent work has suggested that the ammonium ion is also a possible catalyst for these reactions. We will measure the rate constants for the reactions of a number of epoxides using ammonium catalysts via nuclear magnetic resonance analytical methods. This work will allow for a more detailed quantitative modeling of SOA in the atmosphere.
Deirde Haren '16  From: Madison, CT
Advisor: Albert Matlin
Project: **Amine-catalyzed Nazarov Cyclizations**

**Description:** The Nazarov cyclization involves the cyclization of cross-conjugated divinyl ketones to furnish cyclopentenones. These reactions have found great utility in the synthesis of complex natural products. Typically Lewis or Bronsted acids have been used to catalyze the reaction. The Matlin lab is investigating using amines as catalysts with the goal of developing an enantioselective version of the Nazarov cyclization.

![Chemical structure of Nazarov cyclization](image)

Jessica Hubert '16  From: Bellwood, IL
Advisor: Jason Belitsky
Project: **Colorimetric Metal Ion Binding Coatings**

**Description:** Our lab focuses on melanins, ubiquitous but poorly understood biological pigments, and related synthetic materials. Melanins and synthetic analogs have fascinating chemical properties that can be exploited for environmental applications including the binding and sensing of heavy metals and organic pollutants. We recently found a class of synthetic coatings that change color upon binding lead and other metal ions. This Winter Term we are exploring the chemical nature of these coatings, in order to understand their colorimetric properties and develop improved sensors for lead.

**Other Interests:** Ultimate Frisbee and reading.
Vera Hutchison ’17  From: Forest Grove, Oregon.

Advisor: Rebecca Whelan

Project: Bowerbird Paint Analysis

Description: I am working in Professor Whelan’s analytical chemistry lab to study a part of the bowerbird mating process. In addition to making colorful mosaics with objects they find in the forest, male satin bowerbirds masticate leaves to form a paint that they use to decorate their bowers, which the female birds taste. This suggests that this paint is acting as some sort of chemical signal. The project we are working on involves using gas chromatography and mass spectrometry to determine the compounds present in a sample of bowerbird-painted sticks provided by Gerald Borgia of the University of Maryland.

Other Interests: During the regular semester I am involved in research in the neuroscience department and in my free time I enjoy blues dancing. I also spend my time swimming on the College’s Swim Team.

Michael Jacobs ’14  From: Dayton, OH

Advisor: Matt Elrod

Project: Gas Phase Oxidation Kinetics and Mechanisms for Atmospherically Relevant Hydroxynitrates

Description: Isoprene, 2-methyl-1,3 butadiene, is the most abundant non-methane hydrocarbon present in the atmosphere. This volatile alkene, produced mainly by trees, undergoes gas phase reactions to form hydroxynitrate intermediates. The oxidation of isoprene to hydroxynitrates is related to both tropospheric ozone and secondary organic aerosol (SOA) formation, and thus linked to issues of air pollution and global climate change. We are interested in determining the mechanism and rate constants for the reactions of atmospherically relevant isoprene hydroxynitrate intermediates with OH radicals. Specifically, we are investigating the daytime OH radical initiated process using our lab’s unique turbulent flow chemical ionization mass spectrometer (TF-CIMS). These measurements will allow a determination of the efficiency of the gas phase reactions of these hydroxynitrate intermediates, and the role these reactions have on the production of tropospheric ozone and SOA.

Other Interests: Watching the Cincinnati Reds play, reading, and watching movies.
Justin Kang ’15 From: Salem, OR
Advisor: Jesse Rowsell
Project: Crystal Engineering with H-Acid
Description: I am currently pursuing the isolation of a lithium compound of the aromatic sulfonate "H-Acid", an important dye intermediate. Having successfully created other H-acid crystals with magnesium, potassium, calcium, barium, and other Groups 1 and 2 metals, the lithium crystal proves to be elusive because of its substantial solubility in water and rapid degradation. Using a variety of crystallization techniques, I hope to produce a lithium crystal large enough to collect single crystal x-ray diffraction data in order to further understand its crystal structure and compare it to those of the other compounds.
Other Interests: Piano, Pipe Organ, Hiking (and the general great outdoors), Food.

Zach Kisley ’14 From:
Advisor: Albert Matlin
Project: Amine-catalyzed Nazarov Cyclizations
Description: The Nazarov cyclization involves the cyclization of cross-conjugated divinyl ketones to furnish cyclopentenones. These reactions have found great utility in the synthesis of complex natural products. Typically Lewis or Bronsted acids have been used to catalyze the reaction. The Matlin lab is investigating using amines as catalysts with the goal of developing an enantioselective version of the Nazarov cyclization.
Holden Lai '15  From: Hong Kong
Advisor: Jesse Rowsell
Project: Design and Synthesis of Microporous Molecular Crystals
Description: The crystal structure of 1,3,5-tris(4-carboxyphenyl)benzene (TCPB) is microporous and retains its crystallinity even after solvent evaporation. The distinctive packing of TCPB that gives the molecular crystal its extrinsic porosity is largely determined by two intermolecular forces- aromatic stacking between phenyl rings and hydrogen bonding between carboxylic acids. We are interested in probing the effects of different functional groups on the packing of TCPB derivatives as well as designing TCPB-based microporous molecular crystals with functional groups pointed at the pores. These new porous materials will have a wide variety of potential applications in areas such as fuel cells, gas storage and solid-state catalysis. TCPB derivatives will be synthesized and characterized by x-ray diffraction and thermogravimetric analysis.
Other Interests: running, talking, love poems, Hector Berlioz.

Jeff Levy '16  From: Rochelle, New York
Advisor: Jesse Rowsell
Project: Lab Development for Inorganic Chemistry
Description: This Winter Term, I am working on developing experiments for the Inorganic Chemistry course. This includes improving the clarity of the lab manual, troubleshooting labs to understand which errors lead to which results, and experimenting with new ideas that could make the lab safer and more educational. One of the new experiments we are exploring is the crystallization of metal-alcohol complexes as their sulfate salts. We have found the cobalt(II) and nickel(II) complexes form isostructural compounds and we are now optimizing the syntheses and investigating similar compounds of other divalent metals.
Other Interests: Playing Trombone, Skiing, Unicycling.
Sophie Lewandowski '16  From: Readington, NJ
Advisor: Jason Belitsky
Project: Colorimetric Metal Ion Binding Coatings
Description: Our lab focuses on melanins, ubiquitous but poorly understood biological pigments, and related synthetic materials. Melanins and synthetic analogs have fascinating chemical properties that can be exploited for environmental applications including the binding and sensing of heavy metals and organic pollutants. We recently found a class of synthetic coatings that change color upon binding lead and other metal ions. This Winter Term we are exploring the chemical nature of these coatings, in order to understand their colorimetric properties and develop improved sensors for lead.

Other Interests: Running, reading, and watching "Doctor Who".

Elaine Liu '14  From: Newark, DE
Advisor: Catherine Oertel
Project: Synthesis and Structural Chemistry of Lead Oxide Carboxylates
Description: Lead oxide carboxylates are hybrid inorganic-organic compounds in which Pb^{2+} ions are coordinated by both oxide anions and carboxylate ligands. Some members of this family occur as products of lead corrosion, which is damaging to historic lead-rich cultural objects such as organ pipes. Others lead oxide carboxylates have the potential to exhibit non-centrosymmetric structures that give rise to novel optical properties. We recently synthesized and determined structures for several new compounds containing helical Pb_{2}O^{2+} chains coordinated by functionalized benzoate ligands. The compounds containing the inorganic helices are non-centrosymmetric and active for second-harmonic generation (SHG). This winter term project is part of year-long work include hydrothermal synthesis and structural characterization of new lead oxide carboxylate phases with carboxylate and fluorinated carboxylate ligands. We will determine structures using single crystal X-ray diffraction and characterize products via thermogravimetric analysis, UV-Vis spectroscopy, and screening for SHG activity.

Other Interests: dance, soccer, baking and crocheting.
Sarel Loewus '16  From: Pullman, WA
Advisor: Albert Matlin

Project: Amine-catalyzed Nazarov Cyclizations
Description: The Nazarov cyclization involves the cyclization of cross-conjugated divinyl ketones to furnish cyclopentenones. These reactions have found great utility in the synthesis of complex natural products. Typically Lewis or Bronsted acids have been used to catalyze the reaction. The Matlin lab is investigating using amines as catalysts with the goal of developing an enantioselective version of the Nazarov cyclization.

Other Interests: running, German, reading.

Dan Lowes '15  From: Cleveland, OH
Advisor: Rebecca Whelan

Project: Bowerbird Paint Analysis
Description: We are working in Professor Whelan’s analytical chemistry lab to study a part of the bowerbird mating process. In addition to making colorful mosaics with objects they find in the forest, male satin bowerbirds masticate leaves to form a paint that they use to decorate their bowers, which the female birds taste. This suggests that this paint is acting as some sort of chemical signal. The project we are working on involves using gas chromatography and mass spectrometry to determine the compounds present in a sample of bowerbird-painted sticks provided by Gerald Borgia of the University of Maryland.

Other Interests: During the regular semester I am involved in research in the neuroscience department and in my free time I enjoy blues dancing.
Michael McDonald ’14  From: Weston, CT
Advisor: Albert Matlin

Project: Amine-catalyzed Nazarov Cyclizations
Description: The Nazarov cyclization involves the cyclization of cross-conjugated divinyl ketones to furnish cyclopentenones. These reactions have found great utility in the synthesis of complex natural products. Typically Lewis or Bronsted acids have been used to catalyze the reaction. The Matlin lab is investigating using amines as catalysts with the goal of developing an enantioselective version of the Nazarov cyclization.
Other Interests: Baseball, archery, swimming, TV (breaking bad, dexter, american horror story) and hanging out with friends.

Corina Miner ’16  From: Trumansburg, NY
Advisor: Matt Elrod

Project: Kinetics of the Reactions of Methacrolein-Derived Species on Secondary Organic Aerosol
Description: Isoprene, 2-methyl-1,3 butadiene, is the most abundant non-methane hydrocarbon present in the atmosphere. This volatile alkene, produced mainly by trees, plays a key role in the formation of secondary organic aerosol (SOA), which is linked to the issues of air pollution and climate change mechanisms. One of isoprene’s gas phase oxidation products, methacrolein, apparently undergoes gas phase conversion to an epoxide intermediate (MAE), which then undergoes additional chemistry on SOA. We will measure the rate constants of MAE with a number of nucleophiles which are present in ambient SOA using nuclear magnetic resonance analytical methods. These measurements will allow for a more detailed quantitative modeling of isoprene-derived SOA in the atmosphere.
Other Interests: I like to study physics. I also enjoy Arthurian legend, badminton, and flying kites.
Claudia Nunes  ‘17  From: Swarthmore, PA  
Advisor:  Catherine Oertel 

**Project:** Ion-Exchange Synthesis of Complex Niobium and Tantalum Oxides  

**Description:** Complex niobium and tantalum oxides are useful as photocatalysts for processes including water-splitting. Pyrochlore oxides have the general form $A_2M_2O_6O'$, with variable occupancy possible in the A and O' positions. The niobium pyrochlore $K_{1.27}Nb_2(O,OH)\cdot1.2H_2O$ can be synthesized hydrothermally, and previous work in our laboratory has shown that its potassium ions are subject to ion exchange under mild conditions. Replacing $K^+$ with another ion can influence the band gap of the material, which is important in its interaction with light and potential activity as a catalyst. The focus of this month’s work is to expand the group of niobium oxide pyrochlores by replacing $K^+$ with ions including $Ca^{2+}, Ba^{2+}, Zn^{2+}, Cu^+$, and $Bi^{3+}$. The new compounds will be characterized using powder X-ray diffraction, SEM-EDS, UV-Vis spectroscopy, and thermal analysis.

Kurt Pianka  ‘17  From: Manhasset, NY  
Advisor:  Catherine Oertel  

**Project:** Ion-Exchange Synthesis of Complex Niobium and Tantalum Oxides  

**Description:** Complex niobium and tantalum oxides are useful as photocatalysts for processes including water-splitting. Pyrochlore oxides have the general form $A_2M_2O_6O'$, with variable occupancy possible in the A and O' positions. The niobium pyrochlore $K_{1.27}Nb_2(O,OH)\cdot1.2H_2O$ can be synthesized hydrothermally, and previous work in our laboratory has shown that its potassium ions are subject to ion exchange under mild conditions. Replacing $K^+$ with another ion can influence the band gap of the material, which is important in its interaction with light and potential activity as a catalyst. The focus of this month’s work is to expand the group of niobium oxide pyrochlores by replacing $K^+$ with ions including $Ca^{2+}, Ba^{2+}, Zn^{2+}, Cu^+$, and $Bi^{3+}$. The new compounds will be characterized using powder X-ray diffraction, SEM-EDS, UV-Vis spectroscopy, and thermal analysis.
Tom Pires ‘14 From: Carlisle, PA
Advisor: Rebecca Whelan
Project: Aptamer-based colorimetric detection of CA125 using gold nanoparticles
Description: CA125 remains an important biomarker for ovarian cancer in certain populations of women, such as those with a family history of the disease, those who are in remission, and those who are undergoing treatment. For these groups, frequent screening for CA125 is highly important. Currently, CA125 is assayed with an antibody-based test that is costly in terms of time, materials, and instrumentation. Our work aims to develop an alternative assay using gold nanoparticles (AuNPs) and DNA aptamers for detecting CA125, wherein aptamer-CA125 binding allows AuNPs, which would otherwise be stabilized by the aptamers, to aggregate in the presence of high salt concentrations. Owing to their extremely high molar absorptivity, the color change from unaggregated (red) to aggregated (blue) AuNPs is clearly visible to the naked eye. In this way, detection of CA125 could potentially be achieved in an assay that is fast, inexpensive, and instrument-free. This work is supported by the National Cancer Institute.

Eric Rappeport ‘16 From: Randolph, NJ
Advisor: Robert Thompson
Project: Spot Tests and Infrared Spectrophotometry of Street Drugs
Description: More available and less toxic mimics for illicit drugs, such as cocaine, heroin, and methamphetamine, were sought that react with reagents to reveal their identity by color. An acceptable mimic should react with Marquis reagent to give a red-violet color as do most opiates, give an orange-brown color with Marquis reagent as do most amphetamines, or give a blue color with Scott reagent as does cocaine. Following a positive presumptive test, a powder is subjected to infrared spectrophotometry to confirm their identity and the percentage of drug in the powder. Procedures were developed to identify drug mimics for use in analytical chemistry courses.
Harry Ryu ‘16  From: North Liberty, IA
Advisor: Albert Matlin
Project: Amine-catalyzed Nazarov Cyclizations
Description: The Nazarov cyclization involves the cyclization of cross-conjugated divinyl ketones to furnish cyclopentenones. These reactions have found great utility in the synthesis of complex natural products. Typically Lewis or Bronsted acids have been used to catalyze the reaction. The Matlin lab is investigating using amines as catalysts with the goal of developing an enantioselective version of the Nazarov cyclization.

Jamie Shallcross ‘14  From: Metuchen, NJ
Advisor: Rebecca Whelan
Project: Bioinformatic Analysis Applied to Aptamer Selection
Description: I am working on the bioinformatic analysis of the high-throughput sequencing data derived by SELEX experiments performed by other members of the Whelan group. Specifically, we are working to refine and publish a method that combines software I’ve written myself with freely available bioinformatic tools, in a way that should be accessible to bioanalytical chemists. In addition, I'm working on the structural modeling of ovarian cancer biomarker CA125/MUC16, specifically repeated antibody binding epitopes, using the Rosetta suite of bimolecular modeling tools. This work is supported by the National Cancer Institute.
Other Interests: Theater, cooking, science fiction, and queer theory/activism.
Eleanor Spielman-sun ’14  From: Menlo Park, CA
Advisor: Jesse Rowsell
Project: Oxidation/Hydrolysis Reactions of Naphthalenesulfonate Dye Intermediates in Natural Waters
Description: 4-amino-5-hydroxynaphthalene-2,7-disulfonate, known as "H-Acid", is an azo dye intermediate that is produced on a massive industrial scale. Due to its widespread use, large amounts of this soluble compound and its waste products are released into the environment, contaminating water systems. Although H-acid itself is generally considered non-toxic, the identities and toxicities of its oxidation/hydrolysis products are unknown. I am using HPLC-MS to characterize H-acid and its byproducts with the overall goal of determining the reaction pathways and methods for isolating these compounds for further analysis.
Other Interests: Photography, hiking, cooking.

Daniel Starer-Stor ’14  From: New York, NY
Advisor: Jason Belitsky
Project: Synthesis of Dihydroxyindole Oligomers Related to Melanin
Description: Compared to other biochemical entities that are well known to the general public, such as DNA, proteins, carbohydrates, much less is known is about the chemical and biochemical properties of melanins. Even the most basic details, such as the chemical structures of melanins, are uncertain. Eumelanin, the black to brown pigment in humans, is thought to self-assembly from oligomers of dihydroxyindoles. We are using organic and organometallic chemistry to construct model compounds in order to understand eumelanin at the level of its individual components. Following the synthesis of functionalized dihydroxyindole monomers last semester, we are studying their structure and reactivity.
Santino Stropoli ’18  From: Manhattan, NY
Advisor:  Matt Elrod
Project:  Nucleophilic Reactions of Amines with Epoxides on Secondary Organic Aerosol
Description: The reactions of gas phase epoxide intermediates are known to play an important role in secondary organic aerosol (SOA) formation, and are thus linked to the issues of air pollution and global climate change. Previous work has shown that water, alcohols, sulfate, nitrate are important nucleophiles in the reactions of epoxides on SOA. Recent work has suggested that amines are also possible nucleophilic addition agents for these reactions. We will measure the rate constants for the reactions of a number of epoxides using various amines via nuclear magnetic resonance analytical methods. This work will allow for a more detailed quantitative modeling of SOA in the atmosphere.
Other Interests: I am a double degree in chemistry/music. I study violin in the conservatory, but I am also very interested in jazz guitar and flamenco ukulele.

Allison Susin ’16  From: Naperville, Illinois
Advisor:  Robert Thompson
Project:  Determination of Ethanol in Blood
Description: A procedure that can be used in analytical chemistry courses for measuring the amount of ethanol in simulated blood was developed and optimized. Ethanol was determined by headspace sampling, followed by gas chromatography. The results from a literature method and from our method were compared in terms of sensitivity, accuracy, and precision. The method is also useful for determining the ethanol content of alcoholic beverages.
Other Interests: I am a member of the Oberlin college swim team.
Tai Kyu Brian Uhm  ’14  From: Seoul, Korea
Advisor:  Rebecca Whelan

Project:  Selection of DNA Aptamers for Ovarian Cancer Biomarker CA125

Description:  DNA aptamers are oligonucleotides that recognize and bind targets of interest. An ongoing focus of the Whelan lab is the selection of aptamers for ovarian cancer biomarkers, with intended applications in novel diagnostic and therapeutic strategies. The aim of this project is to select an aptamer for CA125, an important biomarker, widely used in the diagnosis and monitoring of ovarian cancer. We are using “One-Pot” based systematic evolution of ligands by exponential enrichment (One-Pot SELEX) to identify DNA oligos with affinity for CA125. One-Pot SELEX separates DNA sequences that bind to CA125 from many possible DNA sequences. After several rounds of SELEX, DNA aptamers with the highest affinity to CA125 are left. Selected aptamers will be characterized using capillary electrophoresis to determine dissociation constant. This approach has been shown by others to increase the speed and efficiency of the selection process. This work is supported by the National Cancer Institute.

Marshall Waller  ’16  From: Marietta, Georgia
Advisor:  Robert Thompson

Project:  Spot Tests and Infrared Spectrophotometry of Street Drugs

Description:  More available and less toxic mimics for illicit drugs, such as cocaine, heroin, and methamphetamine, were sought that react with reagents to reveal their identity by color. An acceptable mimic should react with Marquis reagent to give a red-violet color as do most opiates, give an orange-brown color with Marquis reagent as do most amphetamines, or give a blue color with Scott reagent as does cocaine. Following a positive presumptive test, a powder is subjected to infrared spectrophotometry to confirm their identity and the percentage of drug in the powder. Procedures were developed to identify drug mimics for use in analytical chemistry courses.

Other Interests:  My other interests include swimming, animals, and medicine.
Ren Wiscons ’15 From: Vista, CA

Advisor: Jesse Rowsell

Project: Design and Crystallization of TCPB Derivatives

Description: Porous organic materials are unique because of the interchangeability of molecular units and functional groups that permit nanoporous crystal structure pore scaleability and specialization. TCPB (1,3,5-tris(4-carboxyphenyl)benzene) is a porous organic material that has connected channels that run through its crystal structure, potentially for gas entrapment or filtration. This winter term, I have been synthesizing, crystallizing, and co-crystallizing derivatives of the TCPB structure by adding functional groups to the central benzene ring in order to study how these derivatives modify the properties of the nanoporous structure. In addition to characterizing TCPB derivatives, I also hope to co-crystallize trimesic acid and terephthalic acid to construct a similar, but more flexible, crystal structure to that of the TCPB.

Other Interests: cycling and bicycle mechanics, optical photography, cello.