

The Chemical Record

Volume 57 – Number 3 – May, 2015

Columbus Section of the American Chemical Society, Inc.

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ABOUT THE COLUMBUS SECTION

The Columbus Section of the American Chemical Society comprises approximately 1,500 members who live and work in the following central Ohio counties: Delaware, Fairfield, Fayette, Franklin, Hocking, Knox, Licking, Madison, Marion, Morrow, Muskingum, Perry, Pickaway, Ross, and Union.



The Mission of the American Chemical Society (ACS) is to encourage in the broadest and most liberal manner the advancement of the chemical enterprise and its practitioners. Toward that end, the ACS advances scholarly knowledge, provides professional services and support, communicates with varied audiences, and is actively involved in the science, education, and public policy arenas.

The Columbus Section of the ACS adheres to this mission and the strategic thrusts of the national organization and leadership by providing programs and networking opportunities for Chemistry professionals in Central Ohio.

We invite ACS members and scientists in the community to lend their expertise and talents to our activities in science education, government and legislative policy issues, safety in our industrial plants and in our communities, and care of our land.



MEETING NOTICE



Columbus Section of the American Chemical Society, Inc.
Meeting #878 — May, 2015



**Mechanical Design of DNA Nanostructures and
Measurement Devices**

Carlos Castro

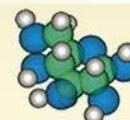
Professor of Mechanical and Aerospace Engineering, Ohio State University

Michael Hudoba

Graduate Student, Mechanical Engineering, Ohio State University

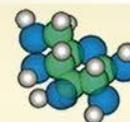
Monday May 18, 2015

**Ohio Dominican University
Bishop Griffin Hall
1261 Sunbury Road
Columbus, Ohio 43219**




PROGRAM DETAILS

5:00 – 6:00 PM	Executive Committee Meeting – All Section Members are welcome to attend
6:00 – 6:45 PM	Social Hour – Appetizers and soft drinks. Beer and wine available on a cash basis.
6:45 – 7:45 PM	Dinner Buffet <ul style="list-style-type: none"> • Mixed green Salad with Italian or Ranch dressing • Lemon Parmesan Chicken • Vegetarian Lasagna • Rice Pilaf • Seasonal vegetables • Chocolate mousse or strawberry shortcake
7:45 – 9:15 PM Program	<ul style="list-style-type: none"> • Presentation of High School Teacher of the Year Award • Mechanical Design of DNA Nanostructures and Measurement Devices
Cost	The charge for dinner is \$20 per person for members and non-members, \$5 for retired and unemployed members, and \$5 for students and high school teachers. Payment will be collected at the door; cash and checks accepted. There is no cost to attend the program only. Remember that this is a dinner order and must be paid. Please help control costs by honoring your order.
RSVP	Please use the voice mail reservations service by calling 614-447-3600 extension 7047. Follow the template for reservations*. Alternatively, please send e-mail with the same information to The Columbus Section at the following e-mail address: acscols@wowway.com or use the Meeting Reservation Form on the Section's website.
*Voicemail/e-mail Reservations Template	<ul style="list-style-type: none"> • First and last name: Please spell last name. • Membership category: member, non-member, retired, emeritus, unemployed, student, high school teacher. • Employer • Your choice of entrée: Parmesan Chicken or Vegetarian Lasagna • Please indicate if you will join us for the <u>Dinner & Program</u> OR <u>Program Only</u> • Your phone number, in case we need to contact you.
Reservation Deadline	Thursday, May 14, 2015, 2015 at 12:00 noon
Program Contact	David Speth: 614-538-0635 or drspeth@sbcglobal.net
Directions & Parking	From the North Take US 23 South to I-270. Take I-270 East to Cleveland until you reach I-670/US 62 West exit 35A. Take I-670 west to the US 62/Fifth Avenue Exit #7. Exit onto Fifth Avenue. Turn Right on Fifth Avenue and proceed to Sunbury Road. Turn right onto Sunbury Road. Bishop Griffin Hall is on the left just before the football stadium From the East Take I-670 west to the US 62/Fifth Avenue Exit #7. Exit onto Fifth Avenue. Turn Right on Fifth Avenue and proceed to Sunbury Road. Turn right onto Sunbury Road. Bishop Griffin Hall is on the left just before the football stadium From the West Take I-670 east to the Leonard Avenue exit #6. Turn left on Leonard Avenue. Veer right under the railroad tracks to stay on Leonard Avenue. Turn left on Sunbury Road. Bishop Griffin Hall is on the left just before the football stadium. From the South Take I-71 north to I-670. Take I-670 to Leonard Avenue. Take the Leonard Avenue exit #6. Turn left on Leonard Avenue. Veer right under the railroad tracks to stay on Leonard Avenue. Turn left on Sunbury Road. Bishop Griffin Hall is on the left just before the football stadium. Parking is free.





ABOUT THE TOPIC:

MECHANICAL DESIGN OF DNA NANOSTRUCTURES AND MEASUREMENT DEVICES

Structural DNA nanotechnology is a rapidly emerging field with great potential for applications such as single molecule sensing, drug delivery, manipulating molecular components, and controlling chemical reactions. Major advances in the last decade have enabled the precise design and fabrication of DNA nanostructures with unprecedented geometric complexity. Our lab has recently even fabricated a nanoscale version of the famous "Script Ohio" using this approach. However, relative to natural biomolecular machines, the functional scope of DNA nanotechnology is limited by an inability to design dynamic mechanical behavior such as complex motion, conformational dynamics, or force generation. Our lab takes inspiration from methods used in macroscopic machine design to develop DNA nanostructures with tunable mechanical properties and dynamic behavior. I will present our recent advances in the design of DNA nanomachines and ongoing projects to implement these devices to probe nanoscale physical properties (e.g. viscosity) or interactions (e.g. molecular forces). In addition, a PhD student in my lab will detail his process of designing and fabricating a DNA "Script Ohio."

ABOUT THE SPEAKERS:

PROFESSOR CARLOS CASTRO AND MIKE HUDOBA

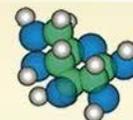
Professor Carlos Castro received his Bachelor's and Master's degrees in Mechanical Engineering both in 2005 from The Ohio State University and his PhD in Mechanical Engineering from the Massachusetts Institute of Technology in 2009 studying the physical properties of biopolymers and immune cells using optical trapping and fluorescence microscopy approaches. He then spent 1.5 years as an Alexander von Humboldt post-doctoral fellow at the Technische Universität München working in the field of DNA nanotechnology. Dr. Castro returned to The Ohio State University in 2011 as an Assistant Professor in the Department of Mechanical and Aerospace Engineering. He has established a state-of-the-art laboratory focused on developing self-assembled DNA nano-devices to probe biophysical function of molecular and cellular systems.

Mike Hudoba is a PhD Candidate in the nanotechnology and Biodesign Lab in the Department of Mechanical and Aerospace Engineering at The Ohio State University. Mike completed his bachelor's degree in mechanical engineering at OSU in 2009 and received his Master's degree in 2011 with a specialty in product design. In 2011 he worked with Professor Castro to start the Nanoengineering and Biodesign Lab (NBL). Work at NBL focuses on creating nanostructures using a process known as DNS Origami to create machines and devices for probing and mimicking biological machinery and systems. Mike's work has been recognized by several institutions. In 2013 he was awarded 1st prize at the Hayes Graduate Student Research Forum and was named a Nanoscale Science and Engineering Fellow. In 2015 he was honored by the Guinness Book of World Records for his record setting "smallest logo constructed from a single uninterrupted DNA strand" the now famous Script Ohio written from DNA. Mike plans to graduate in 2016 and pursue a career in research and education.

CHAIRMAN'S NOTE

By DAVID SPETH

We had a great meeting in April with more than 100 attendees (more than double our normal attendance) for our joint meeting with the Ohio State Undergraduate Chemistry Club. It was a great event. It was good to get professional chemists together with the next generation of scientists. I think both groups enjoyed the interaction. Given the event's success, we are working with the students to plan other activities later this year. Stay tuned.





My apologies to those of who were unable to join us for dinner on April 15. We did not expect such a large turn-out. While the OSU golf course clubhouse is a great facility, they have a limit on the number of people they can serve for dinner so we had to cut off registrations at 104. Next year we will plan accordingly and look for a facility that can accommodate a larger group.

We are now organizing our May meeting. It will be Monday May 18 at Ohio Dominican University. The program will include presentation of the High School Chemistry Teacher of the Year Award and a presentation on using DNA to make nanomachines by Ohio State mechanical engineering **Professor Carlos Castro** and his graduate student **Michael Hudoba**. Keep your eyes open for the meeting registration information.

The May meeting will conclude our spring program. We will resume in September. Right now the September program will include presentation of the Patterson-Crane award for contributions to Chemical Information Science. In October we will present awards to our 50 and 60 year members and hear from the 2015 ACS President elect University of Oklahoma chemistry professor **Donna Nelson**. Among other things, Professor Nelson was the technical advisor to the popular series "Breaking Bad" that has recently gone into reruns. November will bring the joint meeting with the Columbus Section of the American Institute of Chemical Engineers. Ideas for the event would be happily entertained.

Thank you for your support and involvement with the Columbus section. If you like what we are doing, we need your help to continue. If you think we need to make changes, please let us know. We need people with new and different ideas to keep our program alive and vibrant. To this end we need people to step up to participate as members of the Executive Committee. For 2016 we need people to run for Chair, Chair-elect, Secretary, Treasurer-elect, Councilor, and Alternate Councilor. If you would like to get involved at a starter level, we also have standing committees who are always looking for people to help with various Local Section activities. Please let us know if you are interested in volunteering.

At our March meeting, the Executive Committee voted to make a \$2000 contribution to COSI's Academy program. This program is designed to introduce students to the potential for careers in science, technology, engineering and math. Here is the letter of thanks COSI sent to the Columbus Section.

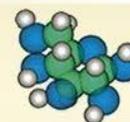
Chain reactions. They happen all the time in science-and in life too: this leads to that leads to that... When you donated to COSI, you set a chain reaction in motion.

Picture a child in Gadgets as he tinkers to build a workable bridge and then, what follows: a moment of discovery leads to a sense of accomplishment. Then, as one former COSI Kid told us, that sense leads to "COSI was the place I went as a child that made me believe I could do anything with my life," and then that belief leads to the pursuit of an exciting engineering career!

In most cases, you never really know exactly which child or teen benefitted from a donation you made. But you can be certain that when you gave to COSI, you gave something extraordinary: a sense of wonder, creativity, and discovery, that powerful sense of possibility...

From toddlers in the little kidspace to teens in our Teen Tech Studio, every day, our young visitors are exploring the world of possibility-what's possible in science and what's possible in their own lives. When those two things intersect, we get genuine, change-your-life impact and help set in motion future academic, career, and life success.

THANK YOU for supporting tomorrow's dreamers, innovators, and bridge builders with your gift to COSI. It truly takes a community to support the brightest minds and our brightest collective future. With your help, we're providing essential sparks of inspiration and all that follows!





We appreciate your ongoing support and look forward to seeing you at COSI again soon.

Sincerely,

David E. Chesebrough, Ed.D.
President and CEO

Silver

SILVER CIRCLE NEWS
By Tom Weeks

Silver

Upcoming Silver Circle activities are as follows:

Fri. May 15 at Ohio EPA headquarters downtown
Thurs June 4 at CAS.

For more details, or to get on the Silver Circle mailing list, contact tomweeks@aol.com

2015 OUTSTANDING COLLEGE CHEMISTRY STUDENT AWARDS
By KELLY MORAN

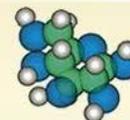
The April ACS meeting at the OSU Golf Course was packed and everyone had a good time. Student awardees attended from Mount Vernon Nazarene University, Muskingum College, Ohio Dominican, Ohio Wesleyan, Otterbein and OSU. Award certificates and checks were mailed to the other Awardees.

Capital
University
Ask. Think. Lead.

Senior **Ryan Rutschilling** has performed research with Dr. William Clark at Capital since his sophomore year. He has also been active in the Chemistry Club, serving as president this year. Ryan was a Chemistry workshop leader for 3 years as well, tutoring general chemistry students. Ryan will be attending OSU's School of Optometry in the fall.



Columbus Section
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DENISON UNIVERSITY

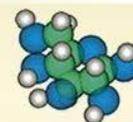
Junior Ann Lindberg strives for perfection, and her hard work consistently reflects that commitment to excellence. Ann has served the Chemistry Department as a laboratory assistant for multiple classes. Ann is studying in New Zealand this semester.

Senior Ariana Gray Be has a passion for effecting positive change through scientific research. She's been a dedicated member of Denison's Department of Chemistry and Biochemistry, working as a tutor, lab assistant and as an officer in the ACS student chapter. She is involved in research as a member of the Reczek group and twice presented her work at ACS National meetings, also co-authoring a publication. Ariana is headed to graduate school in chemistry in the fall.



Junior Alex Oles is a lead tutor in Kenyon's tutoring program, a mainstay in the biochemistry research lab and has been a starter on Kenyon's football team.

Senior Katie Hoener is a lead tutor in Kenyon's tutoring program, active in the research lab and a starter on Kenyon's women's soccer team.





MOUNT  VERNON
NAZARENE UNIVERSITY

Life Changing

Junior Tedroy Jackson is from Kingston, Jamaica. Since coming to the US, he's studied chemistry and played soccer at Roberts Wesleyan College (Rochester, NY) and Mount Vernon. A true liberal-arts student, in his spare time "TJ" is learning to play the piano. He currently assists in the general chemistry lab and hopes to attend medical school.

Senior Brooke Hager has assisted in both the freshman chemistry and biology programs. As president of the chemistry club, she's helped to organize fund-raisers for charitable organizations and recreational activities. She is currently investigating the kinetics of bovine alkaline phosphatase and aspires to become a physician.

MUSKINGUM
UNIVERSITY

Junior Kelli Stack is a Muskingum University Science Division scholar in biochemistry and has been a leader and instructor in the department's efforts in the use of peer-supported learning. This summer she'll be doing an NSF internship at the University of Pennsylvania in the area of catalysis. Kelli is a calculus and chemistry tutor in the university's Student Success Center and a 3-year chemistry stockroom assistant. She's the founding president of the Pre-Health Club and during the summers she volunteers at a free medical clinic in northeastern Ohio.

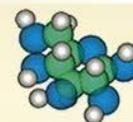
Senior Heidi Landis is a double major in chemistry and geology and a Choose Ohio First scholar. Heidi completed an NSF internship at Northern Arizona University involving applications of stimulated luminescence dating as well as participating in a field camp through Southern Illinois University. She's presented research posters at a Geological Society of America meeting and an ACS regional meeting. Heidi's senior research involves analyzing reclaimed land water samples for acid mine drainage and attempted purification using bentonite clay. She's participated in outreach activities such as afterschool science and math tutoring at a local high school and hands-on demonstration programming for elementary school students. She'll be attending graduate school at Rensselaer Polytechnic Institute (Troy, NY).



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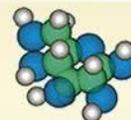


Senior Emily Spencer has consistently performed well in all her courses, has shown great interest in chemistry by asking many questions, and has performed well at a practical level -- all of this in addition to her being a star player on the women's soccer team. Emily gained early entrance to, and will be attending the OSU pharmacy program starting in Fall 2015.



Junior Sara Scinto displays genuine intellectual curiosity and strives to understand the material at a fundamental level. She has ongoing interests at the intersection of nutrition and biochemistry, and the faculty looks forward to seeing her academic career continue to progress.

Senior Niveditha Manivannan has always persisted in trying to understand all the intricacies and answers to every question. She is a fixture around the department, both studying and working in the laboratory. She is active in the social and cultural life at OWU, performing a traditional dance from her native south India during Divali, the Hindu festival of lights. Overall, interacting and working with Nive has been a tremendous joy for the faculty.





Junior Adrienne Bradley is currently conducting research with Prof. Joan Esson developing a nanoparticle-based colorimetric assay for heparinase.

Senior Stephanie Gnewuch was an Undergraduate Research Fellow at the NIST Center for Neutron Research last summer. She's completed her Senior Honors research with Prof. Dean Johnston and recently presented her work at the ACS National Meeting. She plans to attend graduate school.

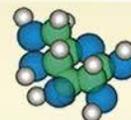
Senior Alexandria Weber spent this past year working on her Senior Honors project with Prof. Robin Grote investigating the synthesis of biologically-interesting heterocycles. Allie recently presented her work at the ACS National Meeting and plans to attend graduate school to study organic chemistry.



THE OHIO STATE UNIVERSITY

Junior Henry Tran is majoring in both chemistry and mathematics and conducting research on Jahn-Teller distortions of the NO_3 molecule in the lab of Emeritus Prof. Terry Miller. He presented his analysis of the IR spectrum's rotational structure at the 2014 International Symposium on Molecular Spectroscopy. He has received a number of grants for his research and academic performance, including an Honors Undergraduate Research Scholarship, the Gary Booth Chemistry Scholarship, the Sophomore Organic Chemistry Award, and the Goldstein Memorial Mathematics Scholarship. Henry serves as an Office of Diversity and Inclusion peer mentor and an Honors peer mentor. Henry recently was named one of 260 national recipients of a Goldwater Scholarship for the coming year.

Senior Nikhil Gupta is majoring in biochemistry and conducting research with Prof. John Byrd in the Department of Hematology on how changes in DNA affects how much the protein ZAP-70, when present in chronic lymphocytic leukemia cancer cells, indicates a more aggressive disease process. Understanding these DNA changes may provide a new source



for target therapy and will give more information on cancer biology. Nikhil has presented his work at the Denman Undergraduate Research Forum. He is the recipient of the 2014 Undergraduate Student Pelotonia Fellowship.

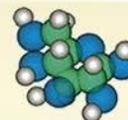
PHOTOGRAPHS FROM APRIL, 2015 SECTION MEETING
BY JOHN KEY, OF LAKE SHORE CRYOTRONICS, INC.



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COLUMBUS SECTION ANNOUNCES HIGH SCHOOL CHEMISTRY TEACHER OF THE YEAR

By Jeff Bracken

Chemistry teacher **Mrs. Tami Golliday** of Bexley High School has been named the High School Chemistry Teacher of the Year by the Columbus Section of the American Chemical Society. Mrs. Golliday will be recognized for this award at the Columbus Section's May meeting. Mrs. Golliday and her school will also receive a cash award for this prestigious honor.

Mrs. Golliday has been a chemistry teacher for twelve years including the past three years at Bexley High School. Throughout her teaching career, Mrs. Golliday has taught a variety of science courses, including regular chemistry, honors chemistry, advanced placement chemistry, and dual enrollment advanced chemistry. She has also taught physical science and has worked as an adjunct professor at Wright State University, Urbana University, and Columbus State Community College.

Mrs. Golliday received her undergraduate degree in zoology, with honors in the liberal arts, from The Ohio State University and a masters degree in science education from the University of Findlay. She has also earned over fifty additional semester hours in a variety of content areas. Her training and collaboration with NASA Langley, NASA Ames, and NASA Glenn has led to personal research regarding the effects of microgravity on natural systems; a grant from Ohio EPA led to Project BLUE (Building Local Unpolluted Environments); and Mrs. Golliday participated as a STEM intern with the Dayton STEM Center at Wright State University to develop a lesson plan teaching students the principles of aerospace engineering.

Mrs. Golliday's colleagues and administrators refer to her as an incredibly inspirational teacher who constantly searches for new methods to help her students learn science. She has initiated numerous collaborations to offer real science research opportunities for her students. In addition to her normal teaching assignment, Mrs. Golliday serves as the International Baccalaureate Personal Project Coordinator, Science Fair Coordinator, Believe in Ohio Coordinator, Science Club Advisor, and assumes many other additional responsibilities. Mrs. Golliday has been described as a passionate teacher at her school who teaches with boundless enthusiasm for science. She credits her students for their love of learning, the Bexley Education Foundation, and her colleagues at Bexley High School for their limitless support.

Each year since 1965, the Columbus Section of the American Chemical Society has awarded the High School Chemistry Teacher of the Year Award to a chemistry teacher in Central Ohio. See <http://columbus.sites.acs.org/outstandingschemistry.htm> for more information about the award and a list of previous recipients.

COLUMBUS SECTION ACS CALENDAR OF EVENTS

Year	Month	Date	Day	Location	Comments
2015	May	14	Thu		Deadline for reservations for May Section meeting at Noon
2015	May	15	Fri	Ohio EPA Headquarters	Silver Circle meeting; see details elsewhere in this issue of <i>The Chemical Record</i> .
2015	May	16	Sat	French Field House, OSU	State Science Day 2015. Judges are needed; see details elsewhere in this issue of <i>The Chemical Record</i> .
2015	May	18	Mon	Ohio Dominican University	Monthly Section meeting. See details elsewhere in this issue of <i>The Chemical Record</i> .
2015	May	27-30		Grand Rapids, MI	2015 Joint Great Lakes / Central Regional ACS Meeting
2015	June	4	Thu	CAS	Silver Circle meeting; see details elsewhere in this issue of <i>The Chemical Record</i> .
2015	August	16-20	Sun – Thu	Boston	Fall ACS National Meeting
2015	October	18-24	Sun – Sat	Everywhere	National Chemistry Week.

