

# THE NUCLEUS

December 2017

Vol. XCVI, No.4

## Monthly Meeting

*A Medicinal Chemistry Symposium  
at Sanofi Genzyme, Waltham  
“Adventures in Medicinal  
Chemistry”*

## Science in your Swimsuit

*By Jennifer Maclachlan*

## Summer Scholar Report

*By Sewon Oh and Jeffery Byers,  
Boston College*

## Photos from NCW and the October Meeting

*By Morton Z. Hoffman*



# Science in your swimsuit: A Cape Cod Science Café for grades K-8

By Jennifer Maclachlan, Photos by Jennifer Maclachlan

On a sweltering summer Wednesday morning in late June where I was enjoying the soft banter of mom talk while we sipped our Diet Cokes and our kids were at swim team practice, my friend Caitlin, who coordinates the swimming program at the Wequaquet Lake Yacht Club (WLYC), asked me if I'd be interested in helping to organize a "science activity afternoon" for the members' kids. "Yes! Of course, I'd love to."

We all pulled up our phone calendars and decided to pair it with an upcoming Sunday Family Potluck, where there was live music scheduled, as those with the live music tend to garner more attendance. I suggested we call it "Science Café Sunday" and the more excited we grew about sharing what activities we would provide, the more moms (who range from elementary to high school teachers) piped in to say they would participate as well. I'd committed to making "Cape Cod Science Café goody bags" for the kids and to provide four hands-on chemistry-related activities.

## Event marketing



By that evening we had an event sign-up posted on the wall and one created in the private "Wequaquet Lake Moms Facebook Page." By the following week the event had made its way onto the wipe board and had been included in the upcoming events club email and the all call script. We had six parents sign up as activity providers and by July 14, 2017 we had 48 kids signed up to attend the premier "Science Café Sunday" on July 16, 2017!

This was truly the extent of promo-

tion that was required for this event since it was essentially a private event for members and guests of the WLYC. We had little promoting to do other than answering questions like "what's a science café?" and encouraging those who were inquisitive about it to attend. This included those with grown children so other members of WLYC could see the quality of programming that members provide to members.

At Comedy Night, while getting a drink at the bar, I had several adults ask me about the upcoming science café. One mother asked me if her college age son could come and help. I told her he could and I made certain to follow up with that family the following week.

Turns out their student attends Mass Maritime Academy, one of our STEM Journey partners, is studying marine engineering, and enjoys public outreach events. Although he couldn't participate at Science Café Sunday, I have connected with him to have him, potentially, work at one of my tables at one of my three upcoming Cape Cod Science Café events: Pop-Up Science Museum at Cape Cod Beer Brewery, the Cape & Islands Council of the Boy Scouts of America Wicked Cool Autumn Welcome (which has won several ChemLuminary awards over the past several years in various categories) and STEM Journey V in 2018.

## Engaging the Northeastern Local Section (NESACS)

Now that it was an actual event with a date, venue, activity providers and an audience and I'd managed to brand it a "science café" I engaged my local ACS section to provide public relations funding (out of our annual budget) for some of the goody bag items, including the bottled water and cookies, which make it a science café and not just a science activity.

I ordered the "Science is Fun" buttons from Educational Innovations. These are always popular at the chem-



Science Café' Sunday goody bag assembly line

istry outreach activities that I organize annually.

I contacted ACS National to re-stock my supply of Chemistry Ambassador sashes, "You're looking at a Chemistry Ambassador" buttons, Chemists Celebrate Earth Day stickers, current copies of Celebrating Chemistry (the National Chemistry Week 2016 edition and the Chemists Celebrate Earth Day 2017 edition).

I had "Save the Date for STEM Journey V" magnets made, Industrial Hygiene Pathways laminated booklets and postcards from the American Industrial Hygiene Association, Postcards from the American Association of Chemistry Teachers (AACT) and had "Cape Cod Science Café" branded nylon drawstring bags to hold the goodies.

Our Local Section Chair, Lee Johnson agreed to travel to the Cape and run an activity table at Science Café Sunday. I contacted our Younger Chemists Committee Social Chair since he has a house on Cape Cod to see if he could attend. He couldn't, but put me in touch with one of the younger chemists who could. My father and NESACS Public Rela-

*continued on page 4*

**The Northeastern Section of the American-Chemical Society, Inc.**

Office: Anna Singer, 12 Corcoran Road,  
Burlington, MA 01803  
(Voice or FAX) (781)272-1966.  
e-mail: secretary@nesacs.org  
NESACS Homepage:  
http://www.NESACS.org

**Officers 2017**

*Chair*

Leland L. Johnson, Jr.  
WuXi AppTec  
Brookline, MA  
(617)304-6474  
lelandljohnson@gmail.com

*Chair-Elect*

Mindy Levine  
35 Cottage St  
Sharon, MA 02067-2130  
(516)697-9688  
mindy.levine@gmail.com

*Immediate Past Chair*

Jerry P. Jasinski  
Keene State College  
Keene, NH 03435-2001  
jjasinski@keene.edu

*Secretary*

Michael Singer  
MilliporeSigma  
3 Strathmore Rd, Natick, MA 01760  
(774)290-1391, Michael.singer@sial.com

*Treasurer*

Ashis Saha  
67 Bow St  
Arlington, MA 02474-2744  
(978)212-5462  
sahaashish1909@gmail.com

*Auditor*

Patrick Gordon

*Archivist*

Ken Mattes

*Trustees*

Ruth Tanner, Peter C. Meltzer, Dorothy Phillips

*Directors-at-Large*

Ralph Scannell, John Burke, David Harris,  
June Lum, Michael P. Filosa, John Neumeyer

**Councilors/Alternate Councilors**

*Term Ends 12/31/2017*

Michael P. Filosa	John Podobinski
Doris I. Lewis	Sonja Strah-Pleyne
Patricia A. Mabrouk	Anna Waclawa Sromek
Mark Tebbe	Mary Burgess
Morton Z. Hoffman	Ralph Scannell

*Term Ends 12/31/2018*

Katherine Lee	Mukund S. Chorghade
Catherine E. Costello	Andrew Scholte
Ruth Tanner	R. Christian Moreton
Jackie O'Neil	Ajay Purohit
Kenneth Mattes	Robert Lichter

*Term Ends 12/31/2019*

Thomas R. Gilbert	Leland L. Johnson, Jr.
Mary Jane Shultz	Mary A. Mahaney
Michael Singer	Jerry P. Jasinski
Lisa Marcaurelle	Sofia Santos
Patrick M. Gordon	

All Chairs of standing Committees, the editor of THE NUCLEUS, and the Trustees of Section Funds are members of the Board of Directors. Any Councilor of the American Chemical Society residing within the section area is an ex officio member of the Board of Directors.



# Contents

## Science in your Swimsuit \_\_\_\_\_ 2

*A Cape Cod Science Cafe' for grades K-8*

*By Jennifer Maclachlan*

## Monthly Meeting \_\_\_\_\_ 5

*A Medicinal Chemistry Symposium at Sanofi Genzyme, Waltham*

*Adventures in Medicinal Chemistry*

## Announcement \_\_\_\_\_ 5

*Announcing the Vote on the 2017 Revision of the NESACS Bylaws*

## Perspectives on a Life in Chemistry: Mentoring \_\_\_\_\_ 7

*A symposium on mentoring to be held at Northeastern University*

## Summer Scholar Report \_\_\_\_\_ 8

*Toward Branched Polymers via Redox-Switchable Iron-Based Catalyst*

*By Sewon Oh and Jeffery A. Byers, Department of Chemistry, Boston College*

## Photos from the October Meeting \_\_\_\_\_ 10

*By Morton Z. Hoffman*

## Photos from National Chemistry Week Events at the Boston Museum of Science \_\_\_\_\_ 11

*By Morton Z. Hoffman*

## Calendar \_\_\_\_\_ 16

**Cover:** *Katherine Mirica, Dartmouth College, speaking at the October Meeting. Photo by Morton Hoffman*

**Editorial Deadlines:** *February 2018 Issue: December 22, 2017*  
*March 2018 Issue: January 22, 2018*

## THE NUCLEUS

*The Nucleus is published monthly, except June and August, by the Northeastern Section of the American Chemical Society, Inc. Forms close for advertising on the 1st of the month of the preceding issue. Text must be received by the editor six weeks before the date of issue.*

**Editor:** Michael P. Filosa, Ph.D., 18 Tamarack Road, Medfield, MA 02052 Email: filosam@verizon.net; Tel: 508-843-9070

**Associate Editors:** Myron S. Simon, 60 Seminary Ave. apt 272, Auburndale, MA 02466  
Morton Z. Hoffman, 23 Williams Rd., Norton, MA 02766

**Board of Publications:** James Phillips (Chair), Mary Mahaney, Ajay Purohit, Ken Drew

**Business Manager:** Vacant

**Advertising Manager:** Vacant; contact Michael Filosa at admanager@nesacs.org

**Calendar Coordinator:** Xavier Herault, Email: xherault@outlook.com

**Photographers:** Morton Hoffman and James Phillips

**Proofreaders:** Donald O. Rickter, Morton Z. Hoffman

**Webmaster:** Roy Hagen, Email: webmaster@nesacs.org

Copyright 2017, Northeastern Section of the American Chemical Society, Inc.

## Swimsuit Science

*Continued from page 2*

tions Chair, Jack Driscoll, also agreed to lead a table.

### Setting the stage for a successful science outreach activity

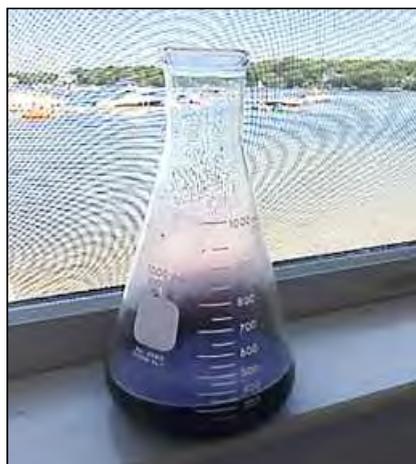
Seize any opportunity to pair science outreach with a public or in this case a private event that has a built-in audience populated with your ideal target audience. The 48 WLYC kids that signed up for Science Café Sunday range in age from 5-13. This is my ideal target audience!

I've been organizing Cape Cod Science Café events for kids since 2011 and this is the first time it's been this easy. Part of the reason this happened is because I have built a reputation as a science outreach provider in my local community largely due in part to using social media to promote and engage locals to attend these events.

I asked the WLYC Past Commodore how many kids attended the most popular event on opening weekend 2017: "The Sponge Bob Crabby Patty Party". The answer was 60, so we each planned for 60 attendees. Caitlin told me that she was going on vacation to Maine and would return the night before the event but had ordered her pizza boxes, aluminum foil and other bits she needed from Amazon for her solar oven making kits.

I told her I could handle setup and I went to my office on Saturday afternoon July 15th to gather the goody bag supplies that had been accumulating over the past week and packed up a variety of chemistry-related activities that work well in a fast-paced public outreach environment. I had learned this from my past experiences at the American Association for the Advancement of Science (AAAS) Family Science Days in Boston, Cambridge Science Festival Science Carnival and Robot Zoo, Wicked Cool Scouts Science Café and STEM Journey.

I arrived at WLYC at 9:30PM just as the Saturday evening Fiesta Night and Family Feud Tournament was winding down so I could help clean up and most importantly, leave the room setup for Science Café Sunday.



*We like to demonstrate the Briggs-Rauscher Oscillating Reaction at our outreach events since it is a captivating experiment.*

### Engaging young volunteers

Science Café Sunday activity providers were asked to arrive at 12:30 PM to select locations and set up their own materials. Since we are all parents, naturally we had our kids with us. I set up an assembly line for the kids and had them "make" the goody bags for me. Then I sent them outside to swim in the lake and we closed the room so we could really get setup. This is an important example for how to engage ACS volunteers (or any volunteers) for that matter: Give them a meaningful task and then dismiss them when they complete it. No one enjoys not being useful or showing up at the appointed time to find that your assigned task has been completed by someone prior to your arrival.

### Facilitating Science Café Sunday

We called in all the kids from the beach and had them sit on the steps the same way they are accustomed to doing for pre-swim meets and I provided a brief overview of what Science Café Sunday was all about and introduced the activity providers. I then asked them to describe their activity. Since we anticipated that all the kids would want to go to the "slime station" first, we had them count off in seven groups of 7 (we ended up with 49 kids participating: 48 signed up, several families didn't show and several showed up on boats that neglected to pre-register and dropped their kids off with us to spend the afternoon doing water sports sans kids).

We assigned each group of 7 kids

## NESACS Sponsors 2016

### Platinum \$5000+

Amgen  
Biogen  
Johnson Matthey  
Millipore-Sigma  
PCI Synthesis  
SK Life Science

### Gold \$3500 up to \$5000

Navin Fluorine

### Silver \$2000 up to \$3500

Abbvie  
American Chemical Society IAC Grant  
Boston Foundation Esselen  
Bristol-Myers Squibb  
Mettler Toledo  
Novartis  
Strem Chemicals  
Vertex Pharmaceuticals

### Bronze \$500 up to \$2000

Alexion  
AstraZeneca  
Chemical Computing Group  
Cydan Development  
DeuteRx LLC  
GL Chemtech International Limited  
JEOL USA Inc  
Organix, Inc.  
Pharmacore  
Relay Therapeutics  
Selvita, Inc.  
Toxikon



*NESACS Public Relations Chair, Jack Driscoll, uses the Happy Atoms magnet kit to explain chemical structures at his Science Café Sunday station*

to a specific activity table leaving one activity table open so when a group finished they moved together to the open

*continued on page 6*

# Monthly Meeting

*The 974<sup>th</sup> Meeting of the Northeastern Section  
of the American Chemical Society  
A Medicinal Chemistry Symposium organized by  
the Medicinal Chemistry Section of NESACS  
Adventures in Medicinal Chemistry*

Thursday, December 7, 2017

## Sanofi Genzyme

153 Second Avenue, Waltham, MA 02451

### Northeastern Conference Room

3:00 pm Refreshments

3:15 pm **Welcome**—Raj Rajur, Medicinal Chemistry Program Chair, CreaGen Inc.

3:20 pm **Introductory Remarks**—Andrew Scholte, Sanofi

3:30 pm Duane Burnett, Aquinnah Pharmaceuticals  
Title: “Molecular Craftmanship”

4:15 pm Boyd Harrison, Harrison Pharma Consulting  
Title: “Discovery & Development of a Potent, Notch-sparing  
gamma-Secretase Inhibitor as a Potential Oral Treatment for  
Alzheimer’s Disease - A Medicinal Chemistry Story”

5:00 pm Paul Rieder, Princeton University  
Title: “Chemistry in Service to Society: Making Drugs For People  
Not Profits”

6:00 pm **Social Hour**

6:45 pm **Dinner**

7:45 pm **Keynote Presentation:**  
John Macor, Sanofi  
Title: “How I spent my summer vacation: insights from a 30-year career in drug discovery”

**NESACS BOARD MEETING:** The Board Meeting will be held from 4:30-5:30 pm in the Purdue Conference Room.

**YOU MUST REGISTER IN ADVANCE TO ATTEND THE SYMPOSIUM: THERE IS NO REGISTRATION FEE. TO ATTEND THE SYMPOSIUM; DINNER RESERVATIONS ARE REQUIRED.**

### THE PUBLIC IS INVITED

- For those who would like to join us for dinner, register by noon, Thursday, November 30, at <https://adventures-in-medicinal-chemistry.eventbrite.com>. Cost: Members, \$30; Non-members, \$35; Retirees, \$20; Students, \$10. Dinner reservations not cancelled at least 24 hours in advance must be paid.
- If you wish to join us for this meeting and not eat dinner, please register by noon, Thursday, November 30 at <https://adventures-in-medicinal-chemistry.eventbrite.com> Select “Seminar only”.

# Announcement

*Announcing the Vote by  
Members and Student  
Members on the 2017 Revision  
of the Bylaws for NESACS  
at the 2017 Annual Meeting  
January 11, 2018*

The NESACS Board of Directors invites all members of the American Chemical Society from the Northeastern Section (NESACS) to attend our 2017 NESACS Annual Meeting at Nova Biomedical in Waltham, MA on January 11th to discuss and to vote on the 2017 Revised Bylaws for the Northeastern Section of the American Chemical Society. We have undertaken the revision of our bylaws to enable electronic voting, change some of the vocabulary used, modernize, and comply with the recommendations from the Committee on Constitution and Bylaws from the American Chemical Society.

This advanced notice of the vote is required by our current governing document, and we wish to comply with all announcement requirements and deadlines therein.

Please see the November 2017 issue of *The Nucleus* and refer to the website ([www.nesacs.org](http://www.nesacs.org)) for the proposed version of the NESACS Bylaws (2017) for consideration as well as our past version of our Constitution and Bylaws (1998).

*continued on page 14*

## **Directions to Sanofi Genzyme Waltham Site**

From North or South 95/Rt 128 South. Take Exit 27B/Winter Street. Follow signs for Second Avenue (stay in right lane)

Take a right after the Embassy Suites Hotel onto Second Avenue. Go past Costco on the right

At Bioverativ take a right between the Bioverativ garage and Bioverativ offices (There is a sign directing you to Genzyme) Proceed about 100 feet

Genzyme will be on the right. Please enter through the main entrance (near stairs) and present yourself. ◇

## Swimsuit Science

Continued from page 4



Although kids and adults alike were in their swim wear and some were even barefoot, we emphasized the importance of everyone wearing personal protective equipment such as goggles when working with liquids and even had the kids clean and help setup the station for the next group coming through.

table. This plan provided pacing at an “organic flow” and was dubbed “one of the best models for hands-on learning” by Michael, WLYC Rear Commodore, who, as an Administrator at the local middle school, has “observed tons of classroom activities in the Barnstable school system.”

### Activities at Science Café Sunday

My go-to activities from my chemistry outreach arsenal included: The simple Steve Spangler Science Chromatography experiments with Skittles™ (Candy Chromatography) and color marker and coffee filter chromatography; pH testing of common household liquids using pH indicator strips (each child got to “test” all of the liquids); UV-sensitive beads that they strung onto pipe cleaner “bracelets.”

We also included the Happy Atoms magnet set and Rocket Reactions, which are a prototype experiment I am alpha testing for ChemAttitudes, a National Science Foundation grant program on which I am currently serving as an advisor.

Parent-led activities included: properties of liquids, make your own lava lamp, a state-of-the-art slime station complete with the desirable foam balls



What's cooler than engineering a solar oven? Testing it out with a 'smore, of course!



Rocket Reactions delights led by NESACS Chair, Lee Johnson

for those who prefer a textured slime (note that we used the covered condiment containers for their take-home slime), oobleck for the kids who don't mind getting messy, and solar oven making with the ultimate bonus of cooking a s'more in it when completed!

Once all the groups finished, we re-assembled the kids at the steps and then had them line up to get a goody bag, a bottle of water and cookies. We sent the kids to the beach just as the band was starting to play on the deck and cleaned the room for the family potluck.

Some parents stuck around and ob-



Even though school is out, these high school and middle school teachers and WLYC members enjoy constructing solar ovens at Science Café Sunday

served from the row of chairs, some dropped off and some curious adults came through various stations and enjoyed the activities as much as the kids did. I had one adult tell me later in the week that he couldn't believe “what an incredible event science café Sunday was and how much he learned”. It is important to note that he didn't have a participating child, he had come down to the club for the family potluck. It was an opportunity to tell him about STEM Journey V, an all-ages public outreach event that we organize annually with the support of NESACS, which includes a keynote lecture on the theme and incorporates hands-on components.

### Science in your swimsuit

During the break when I didn't have a group at my pH table, I went around and took photos and what struck me was that all the kids were in their swimsuits. They are Cape Cod kids and this is normal for them to be in swimsuits during the kids activities like the fishing tournament, bingo night, movie night, Christmas in July etc. and any time they happen to be at WLYC with their families. I told Caitlin that based on the feedback and utter success of the event that I'm going to make this an annual event and that we'll use the same model next year but we'll call it what it is: Science in your swimsuit. ◇

# Perspectives on a Life in Chemistry: Mentoring

---

A symposium highlighting accomplished chemists and the value of mentoring



**Dr. Morton Hoffman**  
Professor Emeritus  
Boston University

**Dr. Dorothy Phillips**  
Retired  
Waters Corporation

**Dr. Thomas Gilbert**  
Associate Professor  
Northeastern  
University

**Dr. Paul Vouros**  
Professor Emeritus  
Northeastern  
University

Introductory remarks - Dr. Mindy Levine, Chair-Elect, NESACS

---

**Date:** Tuesday December 5<sup>th</sup>, 2017

**Symposium:** 3:00-6:00 PM

**Reception:** 5:00 PM to 6:00 PM

**Location:** Northeastern University  
Room 378, 140 The Fenway  
360 Huntington Ave, Boston, MA 02115

Registration: Please email [wcc@nesacs.org](mailto:wcc@nesacs.org) to sign up for this event



Accessible by the MBTA Green Line (E) –  
Northeastern University Station  
Parking Options: Museum of Fine Arts  
Parking Garage or Street parking

Hosted by Northeastern Section of the  
American Chemical Society



# Summer Scholar Report

## Toward Branched Polymers via Redox-Switchable Iron Based Catalyst

Sewon Oh and Jeffery A. Byers, Eugene F. Merkert Chemistry Center, Department of Chemistry, Boston College

### Introduction

In the last century, plastics have become widely used in many different applications, such as packages for food, pharmaceuticals, and cosmetics. Many of these plastics are, however, derived from petrochemicals produced from fossil fuels. Although their durability, low cost, and lightweight certainly benefit our daily lives, their lack of biodegradability adds problems in our environment because they decompose very slowly in nature.<sup>1,2</sup> To mitigate this issue, biodegradable alternatives are necessary. A promising biodegradable polymer is poly(lactic acid) (PLA).<sup>3</sup> PLA is produced by the ring-opening polymerization of lactide, which comes from renewable resources such as corn starch, and can degrade through hydrolytic cleavage of ester bonds.<sup>4</sup> Moreover, PLA has been widely utilized in biomedical devices, such as bone substitutes, due to its biocompatibility.<sup>5</sup> However, there are still limitations in using PLA for other applications because of its undesirable properties, such as its brittleness and its poor oxygen barrier. As a result, polymer chemists have begun to explore various polymer compositions and architectures to improve its physical properties and diversify the utility of this biodegradable plastic.<sup>6</sup>

One architecture for PLA that has been underexplored is branched PLA. It has been reported that introducing even a small number of long-chain branches to PLA significantly affects the rheological, thermal, and mechanical properties of the plastic.<sup>7</sup> Historically, there are two general strategies to synthesize branched PLA. The first method, proposed by Knauss and coworkers, was to use Sn(oct)<sub>2</sub> as a catalyst to polymerize both lactide and glycidol in bulk at 130 °C.<sup>8</sup> For the second strategy, Hedrick and coworkers used a hexahydroxy-functional dendrimer based on 1,1,1-tris(4'-hydroxyphenyl)ethane (TFPE) as an initiator for the ring-opening polymerization of lactide in the presence of a tin-based catalyst. To introduce new chains, the hydroxyl end groups are functionalized with benzylidene-protected 2,2-bis(hydroxymethyl) propionic acid (bis-MPA), followed by deprotection through hydrogenation. Lastly, each step was repeated to make this dendritic polymer larger.<sup>9</sup> Although branches are introduced to PLA through these two methods, they have significant disadvantages. The former reaction has a lack of control in making branches because the catalyst does not selectively polymerize the two monomers, so it is very difficult to predict the branching density and consistently produce the polymers with an identical branching density. In comparison to the first method, the second method has more control over the degree of branching, but the iterative steps may cause much of the loss of product through repeated purifications. As shown by these reactions, there are still many challenges to make branched PLA on a large scale; the focus of this project is to make branched PLA using an alternative strategy that takes advantage of redox-switchable catalysis.<sup>4,11</sup>

In 2013, previous members from the Byers lab have synthesized bis(imino)pyridine iron(II) bis(alkoxide) complexes (1), which were able to polymerize lactide. However, upon *in situ* oxidation of the catalyst, the ring-opening polymerization completely halted and resumed when the catalyst was reduced.<sup>4</sup> Interestingly, epoxides have an orthogonal reactivity, being active in the iron(III) but not the iron(II) oxidation state as shown in Figure 1.

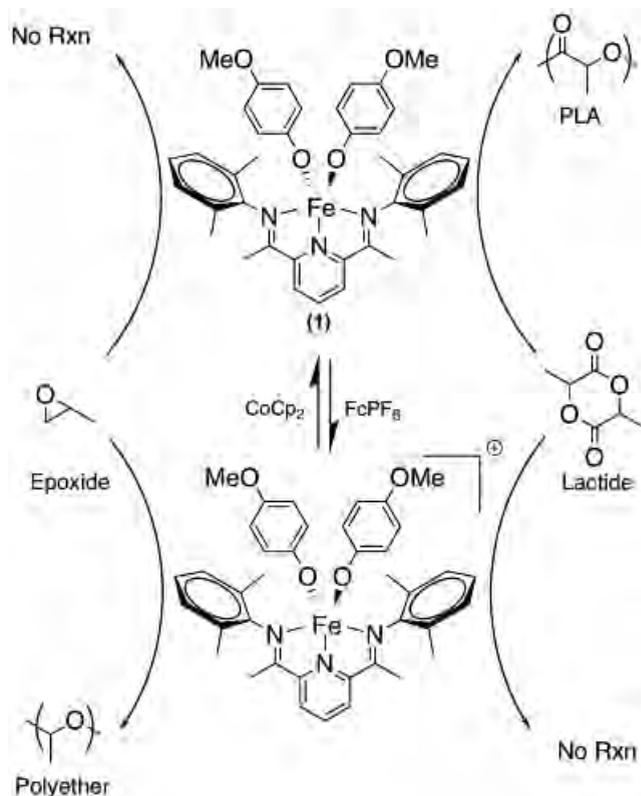
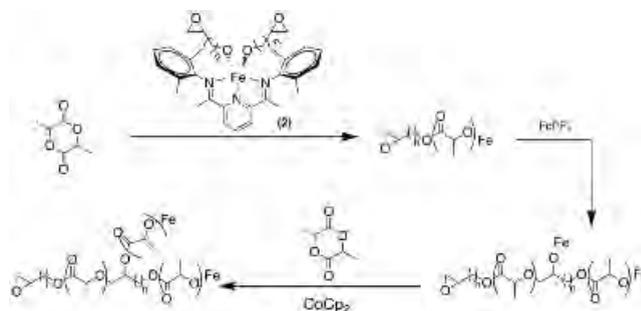


Fig. 1 Redox Switchable Catalyst



Scheme 1 Proposed Synthesis of Branched Polymers).

With this reactivity, the redox-switchable synthesis of block copolymers and cross-linked polymers was achieved.<sup>10,11</sup> To extend this methodology further, we hypothesize that this

## Summer Scholar

Continued from page 8

unique redox-switchable catalytic system can be used for the synthesis of branched polymers when an epoxy alkoxide is used as an initiator for the iron catalysts (**2**) as shown in Scheme 1. If our proposed method works, branched PLA can be synthesized with a controlled manner because the iron-based catalyst selectively polymerizes the monomers depending on its oxidation state. In addition, the overall reaction is more efficient because the oxidation state of the catalyst can be changed *in situ*. The goal of this paper is to explore and understand how to make the optimal catalyst for synthesizing the branched polymers.

### Result and Discussion

#### Ligand Synthesis

The methodology for bis(imino)pyridine ligand synthesis was developed by using a templated synthesis strategy using  $\text{ZnCl}_2$  to pre-coordinate to 2,6-diacetylpyridine as shown in Scheme 2a.<sup>12</sup>  $\text{ZnCl}_2$  is a Lewis acid that makes tridentate coordination bonds with 2,6-diacetylpyridine. This ligand synthesis proceeds upon the addition of glacial acetic acid (AcOH) as solvent. Choosing the proton source with a right  $\text{pK}_a$  is very important. Adding a weaker proton source such as ethanol did not complete the reaction and had a trace amount, if not none, of the desired product. Moreover, when cyclohexylamine was used instead of aniline in the ligand synthesis with AcOH, insoluble salts were produced. We hypothesize using AcOH leads to the protonation of the aliphatic amine, which significantly reduces its nucleophilicity. The powerful aspect of this reaction is that once the bis(imino)pyridine zinc complex is formed, it precipitates out from the solvent. The precipitate can then be filtered and washed with cold diethyl ether or hexane to remove excess reagents and unreacted starting materials. The subsequent demetalation of the ligands is obtained by hydrolysis of the zinc complex in a biphasic mixture of dichloromethane and aqueous potassium oxalate. Recrystallization of the ligand from hot methanol results in high yields of the bis(imino)pyridine ligand.

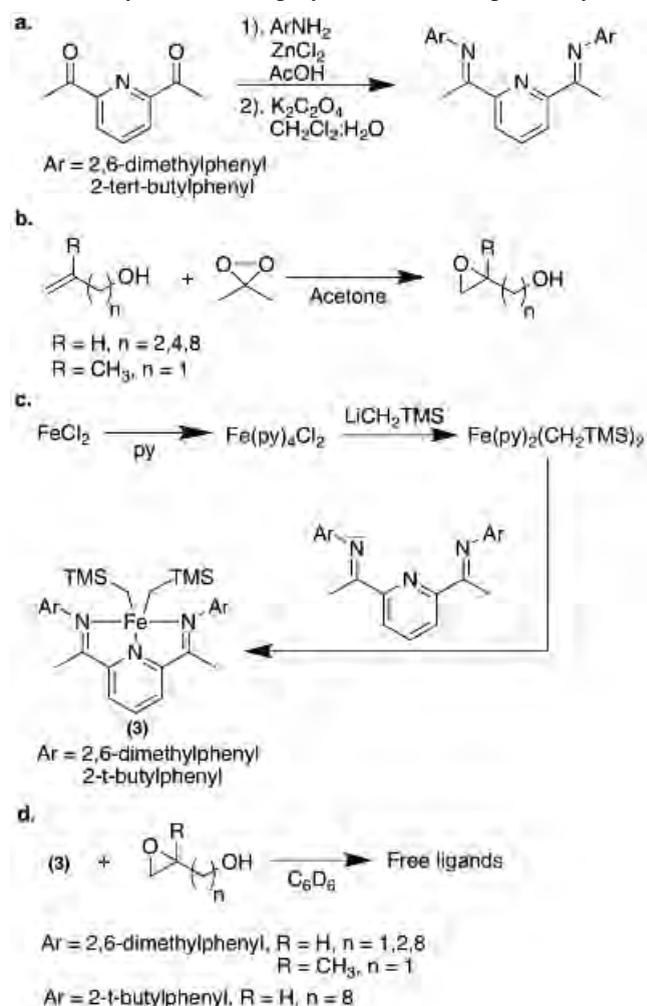
#### Epoxy Alcohol Synthesis

*meta*-Chloroperoxybenzoic acid (m-CPBA) is known as a powerful oxidizing agent to synthesize epoxides from alkenes. However, m-CPBA not only is toxic but also generates a stoichiometric amount of byproduct, which is *m*-chlorobenzoic acid. In this project, dimethyldioxirane (DMDO) was used instead to make epoxy alcohols. Since acetone is produced when DMDO reacts with the alkeneols, no aqueous work up is necessary and simple evaporation of solvent leads to the crude product, which is purified by column chromatography to give the epoxy alcohols (Scheme 2b). This procedure led to clean product for most epoxy alcohols, but the epoxy alcohol derived from 4-penten-1-ol was not obtainable using this procedure. Instead, the epoxy alcohol product undergoes kinetically favored 5-exo cyclization to make a tetrahydrofuran product. To avoid this cyclization reaction, the alcohol group should be protected before epoxidation. 6-exo cyclization also occurred

upon oxidation of 5-hexen-1-ol with DMDO, but since 6-exo cyclization is not as fast as 5-exo cyclizations, the desired epoxy alcohol could be isolated. The competing cyclization reaction was not a problem for small alkeneols like 4-buten-1-ol as well as for large ones such as 9-decen-1-ol, and high yields of the corresponding epoxyalcohols could be obtained.

#### Iron Complex Synthesis

The  $\text{Fe}(\text{PDI})(\text{CH}_2\text{TMS})_2$  (**3**) synthesis was accomplished following literature precedence (Scheme 2c).<sup>4,14</sup> First,  $\text{FeCl}_2$  was stirred in pyridine solvent to give  $\text{Fe}(\text{py})_4\text{Cl}_2$ . Alkylation of  $\text{Fe}(\text{py})_4\text{Cl}_2$  was then achieved using two equivalents of  $\text{LiCH}_2\text{TMS}$  to give  $\text{Fe}(\text{py})_2(\text{CH}_2\text{TMS})_2$  as a red oil.  $\text{Fe}(\text{py})_2(\text{CH}_2\text{TMS})_2$  decomposes within a week even if it is stored in a freezer, so, it must be used as early as possible or stored at low temperatures in a frozen benzene solution. The labile property of pyridine allow the pyridine ligands of  $\text{Fe}(\text{py})_2(\text{CH}_2\text{TMS})_2$  to be replaced by bis(imino)pyridine ligands, which affords the bis(imino)pyridine iron alkyl complex (**3**) as a purple solid. Previously, the last step to make the iron based catalyst for lactide polymerization was protonolysis of



Scheme 2 Synthetic route for the catalyst

continued on page 12

# Photos from the October Meeting - 50 and 60 year members honored

By Morton Z. Hoffman



*Tom Gilbert – 50 years receives his certificate from Dorothy Phillips, Chair of the NESACS Awards Committee.*



*Howard Craig Jordi – 50 Years*



*Martin Isaks – 60 Years*



*Henry Thomas Brown – 50 Years*



*Roger Ervin Shamel – 50 Years*



*David Williams – 60 Years*



*George William Goodloe – 50 Years*



*Frances H. Girard – 60 Years*



*Tom Gilbert, Meeting Chair, with Katherine Mirica, Dartmouth College, the meeting's guest speaker.*

# Photos from National Chemistry Week Events at the Boston Museum of Science

By Morton Z. Hoffman



*CHEMISTRY ROCKS! at the Museum of Science*



*Crystallography, mineralogy and geochemistry with NESACS volunteers.*



*(l-r) Gina Kim (Boston University) and Jonathan Weaver (Salem State University) and the carbon dioxide breath test.*



*Sandy Hoffman reacts carbon dioxide with lime-water.*



*(l-r) Raymond Lam (Massachusetts Maritime Academy), Bassam Shakhshiri (University of Wisconsin-Madison), David Sittenfeld (Boston Museum of Science) and Doris Lewis (Suffolk University).*



*Phyllis A. Brauner Memorial Lecture by Bassam Shakhshiri*



## Summer Scholar

Continued from page 9

the iron alkyl to make discrete iron alkoxide complexes. Thus, attempts to carry out the protonolysis of the alkyl iron complex with epoxy alcohols were made to synthesize the desired epoxy alkoxide iron complex. However, when (**3**) with 2,6-dimethylphenyl group and glycidol were mixed in deuterated benzene, the resulting NMR spectrum did not demonstrate any evidence for paramagnetic peaks and only showed evidence for the free bis(imino)pyridine ligand. We hypothesized that even though alcohol group from epoxy alcohol might ligate to the iron center, the epoxide group might also chelate. In such an instance, the epoxide group could liberate the bis(imino)pyridine ligand.

To prevent this chelation, we increased the number of carbon between the epoxide functionality and the alcohol functionality in the epoxy alcohol. However, when 3,4-epoxy-1-butanol was used for the protonolysis reaction, the resulting NMR spectrum once again only showed evidence for free ligand. At this stage in our investigations, we had two different ways to approach this problem. First, we hypothesized that epoxy alcohol with 2, 3, and 4 methylene spacers could chelate to the iron center to make a thermodynamically stable ring. As a result, we pursued 9,10-epoxy-1-decenol for the protonolysis reaction because this epoxy alcohol has 8 methylene units, which would be too long to form a stable chelate. Second, we hypothesized that using a more sterically hindered epoxide would prevent chelation. With this rationale, 2,3-epoxy-2-methyl-1-propanol was synthesized to test if our hypothesis was correct. Unfortunately, both 9,10-epoxy-1-decenol and 2,3-epoxy-2-methyl-1-propanol failed to ligate with the iron complex because all the paramagnetic peaks were lost. Moreover,  $\text{Fe}(\text{PDI})(\text{CH}_2\text{TMS})_2$  with tert-butylphenyl group was mixed with 9,10-epoxy-1-decenol to see if changing the 2,6-dimethyl groups to a 2-*t*-butyl group would affect the reaction. However, once again, the mixture only showed the free ligands in the NMR spectrum.

### Conclusion

Even though the synthesized epoxy alcohols were not effective to create the desired iron complex needed to synthesize the branched PLA, there are still many directions to explore. For example, aromatic epoxy alcohols have yet to be investigated. Since para-methoxyphenol undergoes protonolysis with the alkyl iron complex, we believe that compounds like epoxy phenol would be able to make the epoxy alkoxide iron complex. Moreover, the steric environment about the epoxide has not been explored extensively. Lastly, modification of the bis(imino)pyridine ligand may also lead to productive results. We have primarily used  $\text{Fe}(\text{PDI})(\text{CH}_2\text{TMS})_2$  with 2,6-dimethylphenyl group thus far, but different ligands such as those derived from 2-*t*-butyl-aniline or with cyclohexylamine have not been extensively explored. We expect that changing the steric environment of the ligand will affect the interaction between the iron complex and the epoxy alcohol so that the discrete iron alkoxides required for lactide polymerization are formed.

## Experimental Section

### General Considerations

All reactions were carried out in open air in the fume hood, except for the synthesis of iron complex, which were carried out in an inert atmosphere glove box. Nuclear magnetic resonance (NMR) spectra were recorded at ambient temperature on a Varian spectrometer ( $^1\text{H}$  500 MHz) in  $\text{CDCl}_3$  or  $\text{C}_6\text{D}_6$  and are referenced versus chemical shifts of residual protic solvent impurities. The line listing for the  $^1\text{H}$  NMR spectra are reported as: chemical shift in ppm (multiplicity, number of protons, coupling constant in Hz). Deuterated solvents were obtained from Cambridge Isotopes Laboratories and used without further purification. All synthesized compounds that were made previously matched the reported spectra in the literature. Reactions were monitored by thin layer chromatography (TLC). TLC was carried out using Merck TLC Silica gel 60 F254 glass plates and stained with cerium ammonium molybdate stain (CAM) and UV light. Flash column chromatography was carried out using 40-63 $\mu\text{m}$  (230 x 400 mesh) sized silica.

### General Procedure for Bis(imino) Pyridine Ligand (PDI) Synthesis<sup>12</sup>

A 250 mL round bottom flask was dried in an oven. 2,6-diacetyl pyridine (0.500 g, 3.06 mmol, 1 equiv.), acetic acid (30 mL), and  $\text{ZnCl}_2$  (0.500g, 3.67 mmol, 1.1 equiv.) were added in the round bottom flask. While stirring, the corresponding aniline (2.4 equiv.) was added to the reaction mixture. The reaction was refluxed for 40 min and then cooled down to room temperature. The yellow precipitates were filtered and washed with cold acetic acid and diethyl ether or hexane. The solid was suspended in  $\text{CH}_2\text{Cl}_2$  (125 mL) and potassium oxalate (5.00 g, 30.1 mmol, 10 equiv.) in water (50.0 mL). The mixture was stirred for 5 min at room temperature. The organic layer was separated and the aqueous layer was washed with  $\text{CH}_2\text{Cl}_2$  (3 x 7.5 mL). All collected organic layer was dried with  $\text{Na}_2\text{SO}_4$ , and the solvent was removed *in vacuo*, which would give yellow solid products.

**2,6-Bis(1-((2,6-dimethylphenyl)imino)ethyl)-pyridine.** Yield: 70%.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ): 2.06 (s, 12H), 2.24(s, 6H), 6.95(t,  $J = 7.5$  Hz, 2H), 7.08(d,  $J = 7.5$  Hz, 4H), 7.92(t,  $J = 7.9$  Hz, 1H), 8.48(d,  $J = 7.8$  Hz, 2H).

**2,6-Bis(1-((2-*tert*-butylphenyl)imino)ethyl)-pyridine.** Yield: 80%.  $^1\text{H}$  NMR (500 MHz,  $\text{CDCl}_3$ ): 1.37(s, 18H), 2.41(s, 6H), 6.54(d,  $J = 7.6$  Hz, 2H), 7.08(t,  $J = 7.6$  Hz, 2H), 7.20(t,  $J = 7.5$  Hz, 2H), 7.43(d,  $J = 8.0$  Hz, 2H), 7.93(t,  $J = 7.8$  Hz, 1H), 8.40(d,  $J = 7.8$  Hz, 2H).

### Synthesis of Dimethyldioxirane<sup>13</sup>

In a 1 L round bottom flask, water (20.0 mL, 1110 mmol, 2.7 equiv.) was added and put at 0 °C in an ice bath. Acetone (30.0 mL, 408 mmol, 1 equiv.) was added to water, followed by  $\text{NaHCO}_3$  (24.0 g, 285 mmol, 0.7 equiv.). The reaction mixture was stirred for 20 min. The stirring was halted, and Oxone (25.0 g, 41 mmol, 0.1 equiv.) was added slowly. The reaction mixture was stirred for another 15 min. The mixture was distilled using a rotovap with the same procedure as the

continued on page 13

# Summer Scholar

Continued from page 12

literature.<sup>13</sup> The collected faint yellow solution was dried with  $\text{Na}_2\text{SO}_4$  and decanted to a graduated cylinder. Less than 10 mL of Acetone was used to rinse and poured into the graduated cylinder. The product solution was poured into a 40 mL vial covered with aluminum foil and stored in a fridge for the following epoxidation reaction. The total volume was about 35 mL and the molarity varied from 0.04-0.07.

## General Procedure for Epoxy Alcohol Synthesis

In a 100 mL round bottom flask, corresponding olefin alcohols (0.9 equiv.) was added and put at 0 °C in an ice bath. DMDO diluted in Acetone (35 mL, 1 equiv.) was added to the flask and stirred for 2 hours. The Acetone solvent was removed using a rotovap and the crude product was passed through column with the Hexane : Ethyl acetate (7:3) eluent. This gave a colorless clear oil.

**2,3-Epoxy-2-Methyl 1-propanol.** Yield: 66%. <sup>1</sup>H NMR (500 MHz,  $\text{CDCl}_3$ ): 1.36(s, 3H), 2.66 d, J = 5.8 Hz, 1H), 2.92 (d, J = 4.6 Hz, 1H), 3.62(d, J = 11.9 Hz, 1H), 3.73(d, J = 12.3 Hz, 1H).

**3,4-Epoxy-1-butanol.** Yield: 52%. <sup>1</sup>H NMR (500 MHz,  $\text{CDCl}_3$ ): 1.72(m, 1H), 1.92(m, 1H), 2.60(dd, J = 4.8, 2.8 Hz, 1H), 2.81(t, J = 4.4 Hz, 1H), 3.10 (m, 1H), 3.82 (t, J = 6.0 Hz, 2H).

**5,6-Epoxy-1-hexanol.** Yield: 25%. <sup>1</sup>H NMR (500 MHz,  $\text{CDCl}_3$ ): 1.29 (br, 1H), 1.52-1.67 (m, 6 H), 2.48(dd, J = 5.0, 2.7 Hz, 1H), 2.76(t, J = 4.5 Hz, 1H), 2.92(m, 1H), 3.67(t, J = 6.2 Hz, 2H).

**9,10-Epoxy-1-decanol.** Yield: 57%. <sup>1</sup>H NMR (500 MHz,  $\text{CDCl}_3$ ): 1.32 (br, 8H), 1.48-1.60 (m, 6H), 2.46 (dd, J = 5.1, 2.7 Hz, 1H), 2.75(t, J = 4.5 Hz, 1H), 2.90 (m, 1H), 3.64 (t, J = 6.6 Hz, 2H).

## Synthesis of $\text{Fe}(\text{py})_4\text{Cl}_2$ <sup>4,14</sup>

In a glovebox,  $\text{FeCl}_2$  (10.0 g, 78.9 mmol) was added to a two-neck round bottom flask equipped with a septum and a 180° joint. The round bottom flask was taken out from the glove box, cooled to -20.0C in an ethylene glycol dry ice bath under Nitrogen from the schlenk line. Freshly distilled pyridine (100 mL) was added dropwise to the flask while stirring the reaction mixture. After the addition of pyridine, the reaction was stirred for 4 hours. Flask smoked, and yellow solid appeared. After all pyridine was pumped into the secondary trap, the flask was tightly sealed and brought to the glovebox. The solid was washed on a frit with copious amount of pentane. The yellow powder was dried *in vacuo* overnight. Yield: 94% <sup>1</sup>H NMR (500 MHz,  $\text{C}_6\text{D}_6$ ): 3.30, 4.97, 7.99.

## Synthesis of $\text{Fe}(\text{py})_2(\text{CH}_2\text{TMS})_2$ <sup>4,14</sup>

In a glovebox,  $\text{Fe}(\text{py})_4\text{Cl}_2$  (0.600 g, 1.35 mmol, 1 equiv.) was suspended in a vial with pentane (4.00 mL) and put in a freezer for 30 min.  $\text{LiCH}_2\text{TMS}$  (0.255 g, 2.71 mmol, 2 equiv.) was dissolved in pentane (3.00 mL). The iron solution was taken out from the freezer and stirred at room temperature. Then,  $\text{LiCH}_2\text{TMS}$  solution was slowly added to the iron so-

lution, changing the color from yellow to red. The reaction mixture was stirred for an hour. The crude product was run through a frit with celite with a copious amount of pentane. Pentane was evaporated *in vacuo*. The product was a red oil and yielded 89%. <sup>1</sup>H NMR (500 MHz,  $\text{C}_6\text{D}_6$ ): 10.85, 16.07, 36.85.

## Synthesis of $\text{Fe}(\text{PDI})_2,6\text{-dimethyl}(\text{CH}_2\text{TMS})_2$ <sup>4,14</sup>

In a glovebox,  $\text{Fe}(\text{py})_2(\text{CH}_2\text{TMS})_2$  (0.385 g, 0.991 mmol, 1 equiv.) was added in a vial and dissolved in pentane (3 mL). 2,6-Bis(1-((2,6-dimethylphenyl)imino)ethyl)-pyridine (0.319 g, 0.864 mmol, 0.87 equiv.) was added in a vial and suspended in pentane (3.00 mL). The iron complex solution was added to the vial with the pyridine ligand. The reaction mixture was stirred for a few seconds, and the color of the solution changed from red to purple. The reaction mixture was passed through a frit with celite and pentane was used to wash. Pentane was dried *in vacuo*. The product was put at a minimum amount of pentane for recrystallization overnight in a freezer. The product was a purple solid and yielded 75%. <sup>1</sup>H NMR (500 MHz,  $\text{C}_6\text{D}_6$ ): -147.32, -16.28, 11.55, 12.89, 22.80, 57.80.

## Synthesis of $\text{Fe}(\text{PDI})_2\text{-t-butyl}(\text{CH}_2\text{TMS})_2$ <sup>4,14</sup>

In a glovebox,  $\text{Fe}(\text{py})_2(\text{CH}_2\text{TMS})_2$  (0.167 g, 0.431 mmol, 1 equiv.) was added in a vial and dissolved in toluene (2 mL). 2,6-Bis(1-((2-tert-butylphenyl)imino)ethyl)-pyridine (0.157 g, 0.369 mmol, 0.86 equiv.) was added in a vial and dissolved in toluene (2 mL). The iron complex solution was added to the vial with the pyridine ligand. The reaction mixture was stirred for a few seconds, and the color of the solution changed from red to purple. The solvent was removed *in vacuo* and dissolved in pentane. The reaction mixture was passed through a frit with celite and pentane was used to wash. Pentane was dried *in vacuo*. The product was put at a minimum amount of pentane for recrystallization overnight in a freezer. The product was purple and yielded 73%. <sup>1</sup>H NMR (500 MHz,  $\text{C}_6\text{D}_6$ ): -151.35, -43.54, -16.99, 12.14, 18.50, 52.21.

## Bibliography

- Berto, D.; Rampazzo, F.; Gion, C.; Noventa, S.; Ronchi, F.; Traldi, U.; Giorgi, G.; Cicero, A. M.; Giovanardi, O. *Chemosphere*. **2017**, *176*, 47-56.
- Thompson, R. C.; Swan, S. H.; Moore, C. J.; von Saal, F. *S. Phil. Trans. R. Soc. B*. **2009**, *364*, 2115-2126.
- Liu, C.; Jia, Y.; He, A. *Int. J. Polym. Sci.* **2013**, *2013*, 1-6.
- Biernesser, A. B.; Li, B.; Byers, J. A. *J. Am. Chem. Soc.* **2013**, *135(44)*, 16553-16560.
- De Tayrac, R.; Chentouf, S.; Garreau, H.; Braud, C.; Guiraud, I.; Boudeville, P.; Vert, M. J. *Biomed. Mater. Res. Part B Appl. Biomater.* **2007**, *85B(2)*, 529-536.
- Gupta, B.; Revagade, N.; Hilborn, J. *Prog. Polym. Sci.* **2007**, *32*, 455-482.
- Chen, C.; Ke, D.; Zheng, T.; He, G.; Cao, X.; Liao, X. *Ind. Eng. Chem. Res.* **2016**, *55*, 597-605.
- Pitet, L. M.; Hait, S. B.; Lanyk, T. J.; Kanuss, D. M. *Macromolecules*. **2007**, *40*, 2327-2334.

continued on page 14

## DIRECTORY

### CAREER SERVICES

#### SEARCHING FOR THAT SPECIAL JOB?

There are many companies and organizations searching for chemical and biochemical personnel to fill important jobs in their organizations.

- Companies for laboratory and management positions
- Universities & Colleges for teaching positions and laboratory personnel
- Hospitals for technical and research personnel

There are several web sites that may help you search for these open positions.

- [www.mboservices.net](http://www.mboservices.net)
- [www.nesacs.org](http://www.nesacs.org)

#### WOULD YOU BELIEVE?

- Our Section (NESACS) is the largest in the ACS.
- We have more volunteers than any other Section.
- We have more activities than any other Section.
- The Nucleus has been voted at several ACS National meetings to be the best Section newsletter.
- We are expanding Nucleus and NESACS web site coverage of activities.

The Following positions are open

1. Photo Journalists
2. Book Reviewers
3. Corporate and Local news reporters
4. Copy Editors
5. Volunteer Coordinator

If you would like to be active in this vibrant organization, please contact Board of Publications member Michael Filosa  
[filosam@verizon.net](mailto:filosam@verizon.net)

*No experience needed  
Just a willingness to participate  
and a sense of humor*

## NESACS Bylaws Vote Summer Scholar

Continued from page 5

As long as you are a member of the ACS and select "NESACS" as your section, you will be eligible to vote as a member or student member. Under our current rules, neither Society Affiliates nor Local Section Affiliates are eligible to vote on the bylaws.

As you register for the January meeting, your eligibility to vote will be cross-checked with the National ACS, and those eligible to vote will have an indicator (name badge or wrist band) on the day of the event.

If you have any questions, please contact Leland Johnson ([chemlee@yahoo.com](mailto:chemlee@yahoo.com)).

The NESACS Bylaws working group consists of Tom Gilbert, Doris Lewis, Michael Singer, Ruth Tanner, Brian D'Amico, Leland Johnson, and John Podobinski. We wish to also thank Professor Cathy Costello and the National Committee on Constitution and Bylaws for their work and for the very fast revision process on the national level. Many in the working group will be in attendance at the Annual Meeting and we will have a limited discussion period for your questions. ◇

Continued from page 13

9. Trollsas, M.; Atthoff, B.; Claesson, H.; Hedrick, J. L. *J. Polym. Sci. A Polym. Chem.* **2004**, *42*(5), 1174-1188.
10. Biernesser, A. B.; Delle Chiaie, K. R.; Curley, J. B.; Byers, J. A. *Angew. Chem. Int. Ed.* **2016**, *55*(17), 5251-5254.
11. Delle Chiaie, K. R.; Yablon, L. M.; Biernesser, A. B.; Michalowski, G. R.; Sudyn, A. W.; Byers, J. A. *Polym. Chem.* **2016**, *7*, 4675-4681.
12. Rosa, V.; Avilés, T.; Aullon, G.; Covelo, B.; Lodeiro, C. *Inorg Chem.* **2008**, *47*, 7734-7744
13. DeMatteo, P. W.; Hassan, R. A.; Taber, D. F. *Org. Synth.* **2013**, *90*, 350-357.
14. Cámpora, J.; Naz, A. M.; Palma, P.; Álvarez, E.; Reyes, M. L. *Organometallics.* **2005**, *24*, 4878-4881. ◇

Your one-stop source to career-related links in the Chemical Sciences

[WWW.NESACS.ORG/CAREERS](http://WWW.NESACS.ORG/CAREERS)

Looking for seminars in the Boston area?

Check out the NESACS Calendar

[www.nesacs.org/seminars](http://www.nesacs.org/seminars)

Q. Exactly, how many awards and scholarships does NESACS sponsor?

A) One    b) Two    c) Many

[www.nesacs.org/awards](http://www.nesacs.org/awards)

SURPRISE

our editor by calling and saying you appreciate the quality and content of our newsletter. Our editor works hard to maintain a publication of interest to our membership. Oh, and by the way you could also give credit to our advertisers who financially support us.

#### The NESACS website

Updated frequently · Late-breaking news · position postings  
Back issues of the Nucleus archived · Career-related Links · Awards and Scholarships

[WWW.NESACS.org](http://WWW.NESACS.org)

# BUSINESS DIRECTORY

## SERVICES

**NMR**Service **500MHz**  
 \*Mass  
 \*Elemental Analysis  
**NuMega Resonance Labs**  
 numegalabs.com P- 858-793-6057

**Custom Synthesis of Chemicals**  
 Gram to Commercial Production  
 On-time Delivery, Quality & Competitive Price  
**TYGER Scientific Inc.**  
 324 Stokes Ave. Ewing, NJ 08638  
 Phone: 888-329-8990  
 Email: sales@tygersci.com

## TELL OUR ADVERTISERS

Membership surveys show that you want more articles in our newsletter. If you tell our advertisers that you saw their ad here, they will provide more financial support and this will allow us to add more articles.

## SERVICES

**ORGANIX** INC.  
 Your Partner in  
 Organic & Medicinal Chemistry  
 Providing Services Since 1986

Services:

- Custom Synthesis
- Hit-to-Lead Programs
- Structure Activity Programs
- 1H NMR and 13C NMR
- LC/MS Services

Strengths:

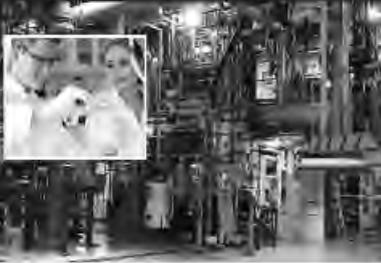
- Outstanding Communications
- Reliable Time Management
- Experienced Ph.D. Scientists

*On Target - On Time - On Budget*

Massachusetts, USA  
 Phone: (781) 932-4142  
 Fax: (781) 933-6695  
 Email: organix@organixinc.com  
[www.organixinc.com](http://www.organixinc.com)

## SERVICES

**Why Choose PCI Synthesis?**



PCI provides process research and chemical manufacturing services from early development through commercialization.

- FDA Inspected Facilities
- Chemical Synthesis ■ cGMP Synthesis

*TRANSFORMING basic or proprietary CHEMISTRY TECHNOLOGY into precise REQUIREMENTS our CUSTOMERS seek.*

**PCI Synthesis**  
 Together Moving Ideas Forward  
 9 Opportunity Way, Newburyport, MA 01950  
**978.462.5555**  
[www.pcisynthesis.com](http://www.pcisynthesis.com)

## Micron Analytical Services



COMPLETE MATERIALS CHARACTERIZATION  
 MORPHOLOGY CHEMISTRY STRUCTURE

SEM/EDXA • EPA/WDXA • XRD XRF • ESCA • AUGER • FTIR • DSC/TGA

Registered with FDA • DEA GMP/GLP Compliant

3815 Lancaster Pike Wilmington DE. 19805 Voice 302-998-1184, Fax 302-998-1836  
 E-Mail [micronanalytical@compuserve.com](mailto:micronanalytical@compuserve.com) Web Page: [www.micronanalytical.com](http://www.micronanalytical.com)

## WANT MORE ARTICLES

When you tell our advertisers that you saw their ads here they have more confidence in our newsletter's viability as an advertising medium. They advertise more. This supports our many activities.



## Robertson Microlit Laboratories

*Where speed and accuracy are elemental*

Elemental CHN, S, X, Analysis (same day service)	GC-MS
Metals by ICP-OES, ICP-MS, A/A	Polarimetry
FTIR, UV/VIS Spectroscopy	DSC, TGA, melting point
Ion Chromatography	KF Aquametry, Titrmetry

1705 U.S. Highway 46 • Suite 1D • Ledgewood, NJ 07852 • 973.966.6668 • F 973.966.0136  
[www.robertson-microlit.com](http://www.robertson-microlit.com) • email: [results@robertson-microlit.com](mailto:results@robertson-microlit.com)

**Rapid Results • Quality • Accuracy • Competitive Pricing**

## Index of Advertisers

Eastern Scientific Co. ....	16
Micron, Inc. ....	15
NuMega Resonance Labs	15
Organix, Inc. ....	15
PCI Synthesis.....	15
Robertson Microlit Labs..	15
Tyger Scientific, Inc. ....	15

18 Tamarack Road  
Medfield, MA 02052

# THE NUCLEUS

NONPROFIT ORG.  
U.S. POSTAGE PAID  
NORTHEASTERN  
SECTION  
AMERICAN CHEMICAL  
SOCIETY



Eastern Scientific

www.easternsci.com

781-826-3456

## Vacuum Pump Problems?

Eastern Scientific specializes in the repair and precision rebuilding of all makes of mechanical vacuum pumps.

*Free pick-up & delivery  
Restrictions apply*



## Calendar

Check the NESACS home page for late Calendar additions:  
<http://www.NESACS.org>

Note also the Chemistry Department web pages for travel directions and updates. These include:

<http://www.bc.edu/schools/cas/chemistry/seminars.html>  
<http://www.bu.edu/chemistry/seminars/>  
<http://www.brandeis.edu/departments/chemistry/events/index.html>  
<http://chemistry.harvard.edu/calendar/upcoming>  
<http://www.northeastern.edu/cos/chemistry/events-2/>  
<http://chemistry.mit.edu/events/all>  
<http://chem.tufts.edu/seminars.html>  
<http://engineering.tufts.edu/chbe/newsEvents/seminarSeries/index.asp>  
<http://www.chem.umb.edu>  
<http://www.umassd.edu/cas/chemistry/>  
<http://www.uml.edu/Sciences/chemistry/Seminars-and-Colloquia.aspx>  
<http://www.unh.edu/chemistry/events>  
<https://www.wpi.edu/academics/departments/chemistry-biochemistry>

### December 1

17<sup>th</sup> Sukant Tripathy Memorial Symposium  
UMass-Lowell Inn and Conference Center  
8:00 am – 4:00 pm

### December 4

Prof. Suzanne Bart (Purdue)  
Boston University, Metcalf, Rm 113  
4:00 pm

### December 5

Dr. Andrew Leduc (Alkermes Pharmaceuticals)  
Univ. of New Hampshire, Parsons N104  
11:10 am

### December 6

Prof. Matthew Lockett (North Carolina - Chapel Hill)  
*"Analytical Sensors, Surface Chemistry, Array Fabrication, 3D Cell Culture Systems, Microfabricated Devices."*  
Northeastern, 129 Hurtig Hall  
12:00 pm

### December 7

Prof. Dor Ben-Amotz (Purdue)  
Tufts, Pearson, Rm. P106  
4:30 pm

Prof. Ethan Baxter (Boston College)  
Boston College, Merkert 130  
4:00 pm

Prof. Svetlana Lutsenko (Johns Hopkins)  
*"ATP-driven Copper Transport and Cellular Redox Balance."*  
WPI, Gateway Park, Room 1002  
12:00 pm

### December 13

Prof. Matthew Kanan (Stanford)  
Harvard/MIT seminar at MIT, location TBA  
4:15 pm

**Notices for The Nucleus  
Calendar of Seminars should be sent to:**

Xavier Herault, email:  
[xherault@outlook.com](mailto:xherault@outlook.com) ◇



Join  
**NESACS**  
on facebook

[www.facebook.com/nesacs](http://www.facebook.com/nesacs)

## What's Yours?

DMPK Scientist,  
LC/MS Product Specialist,  
Mass Spec Operator,  
Staff Investigator,  
Process Chemist,  
QA Manager,  
Synthetic Chemist,  
Lab Instructor . . .

Many local employers post positions  
on the NESACS job board.

Find yours at  
[www.nesacs.org/jobs](http://www.nesacs.org/jobs)