

inChemistry

THE MAGAZINE FOR ACS STUDENT MEMBERS

April/May 2013



Gearing Up for Grad School and the Working World

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• **Tips for Surviving the First Year of Graduate School** PAGE 12

• **Improving Your Prospects through Internships and Training** PAGE 14



Building Chemical Bonds:
Academia-Industry-Government

SERMACS 2013 UNDERGRADUATE PROGRAM

Loews Hotel Atlanta
Atlanta, Georgia
November 12-17, 2013

www.sermacs2013.org

UNDERGRADUATE

NOVEMBER 14

Welcome and Ice Cream Social

NOVEMBER 15

Employment Workshop
Graduate School Fair
Academia, Industry, and Government
Graduate Student Panel and Lunch
Oral and Poster Presentations
World of Coca Cola Tour
Undergraduate Social/Mixer

NOVEMBER 16

Chemistry Demonstration Exchange
Academia, Industry, and Government
Keynote Speaker and Awards Luncheon

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EDITOR Nancy Bakowski

MANAGING EDITOR Lori Betsock

EDITORIAL ASSISTANT Robin Lindsey

ASSOCIATE EDITOR Chris Zeigler

COPY EDITORS Eric R. Stewart
Karen Müller

DESIGN & PRODUCTION Amy Phifer
Plum Creative Services

DIRECTOR, EDUCATION DIVISION, ACS
Mary M. Kirchhoff

ASSISTANT DIRECTOR FOR HIGHER EDUCATION, ACS
Jodi L. Wesemann

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Cover: Hemasudha Chatragadda, a junior at Duquesne University, places a nano liquid chromatography electrospray chip into a quadrupole time-of-flight mass spectrometer. 3

HEY, YOU NEVER KNOW.



PROBABILITY PARTY!



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EDITORIAL: Be on the Lookout for Your Passion

BY ANDY JORGENSEN

I am sure you get plenty of career advice from parents and teachers, but please allow me to provide just a little more — with my own particular focus.


No matter where you are in your educational pursuit, it is never too early (or too late) to think about your answer to the question, “What do you want to be when you grow up?” Of course, you are already grown up in many ways — but you still have many choices to make and experiences to explore as you work your way from student to professional. Each class that you take, and each out-of-class activity you complete, can provide valuable information to help you decide on the ideal direction to take.

For example, did that speech class you took tell you that you would relish the role of presenting your ideas to an audience? Did that writing class, where you wrote about something you had learned, bring you so much satisfaction that you would want writing to be an emphasis in your professional life? And which chemistry class excited you so much that you decided to make that particular branch of chemistry the focus of your future work?

Your answers to these questions can provide very strong guidance to you as you think about your future choices as a scientist, engineer, or related professional. You will want to be sure that you are listening to your mind as it works in the various dimensions that academic study provides for you. Be sure to be open to invitations to work on a research project, help design an experiment, or be a lab assistant to help others learn chemistry.

As you are considering both the direction and focus of your future, think about how you feel when you complete a project. Was the outcome worth the effort — to you, to your employer, to society? There are many challenges in the world, but we are fortunate in that chemistry can often be used to make improvements and even major breakthroughs in a wide variety of important areas.

To name just one example, the subject of sustainability is frequently mentioned as one of chemistry’s most exciting frontiers. This principle basically says that we should live in such a way that those who come after us can also enjoy the benefits of the Earth and the society that preceded them. You will almost certainly be asked to include sustainable features in what you do, produce, or design. Having experience in and appreciation of sustainability as you plan for the future will place you in a good position. Of course, sustainability is just one of many values that you could use to help in your decision-making process.

You will not pass this way again, so be sure to look ahead using the insights you gain along the way! 



Andy Jorgensen, chair of the ACS Society Committee on Education, is an associate professor and director of general chemistry at the University of Toledo. He also serves as a senior fellow at the National Council for Science and the Environment.

ACS CALENDAR

APRIL

7–11

245th ACS National Meeting,
New Orleans, LA

22 Chemists Celebrate Earth Day

MAY

15–17

44th ACS Central Regional
Meeting (CERM), Mount
Pleasant, MI

22 ACS Student Chapter Reports
due

JUNE

5–8

Great Lakes Regional Meeting
(GLRM), La Crosse, WI

13 Final reports for 2012–2013
Community Interactions
Grants and Innovative
Activities Grants due

27 Chapter travel grant
applications for the 246th
ACS National Meeting in
Indianapolis, IN, due

JULY

21–24

Northwest Regional Meeting
(NORM), Corvallis, OR

SEPTEMBER

8–12

246th ACS National Meeting,
Indianapolis, IN

15 Applications for the
ACS Women Chemists
Committee/Eli Lilly and
Company Travel Award due
www.acs.org/diversity

Charting Your Path to Success

New Career Pathways Workshops Provide Valuable Insights and Skills

BY ERIC STEWART

One of the most interesting and important topics involving chemistry is rarely taught in universities and colleges. Even when it is addressed, it's seldom given anywhere near the amount of time and attention it deserves, according to many experts. What is this mysterious topic? It's your own career — and the many related choices and decisions facing you.

It's easy to understand why the topic doesn't get more attention. After all, you have that inorganic synthesis to master, not to mention that midterm to study for... so why not focus on what you're being tested and graded on, and let that whole career thing work itself out later?

The answer is that now is the *ideal* time to start planning your career, because it's still fairly easy for you to take steps that will later help you find the type of work that is the best, most rewarding, match for you.

A new way to prepare

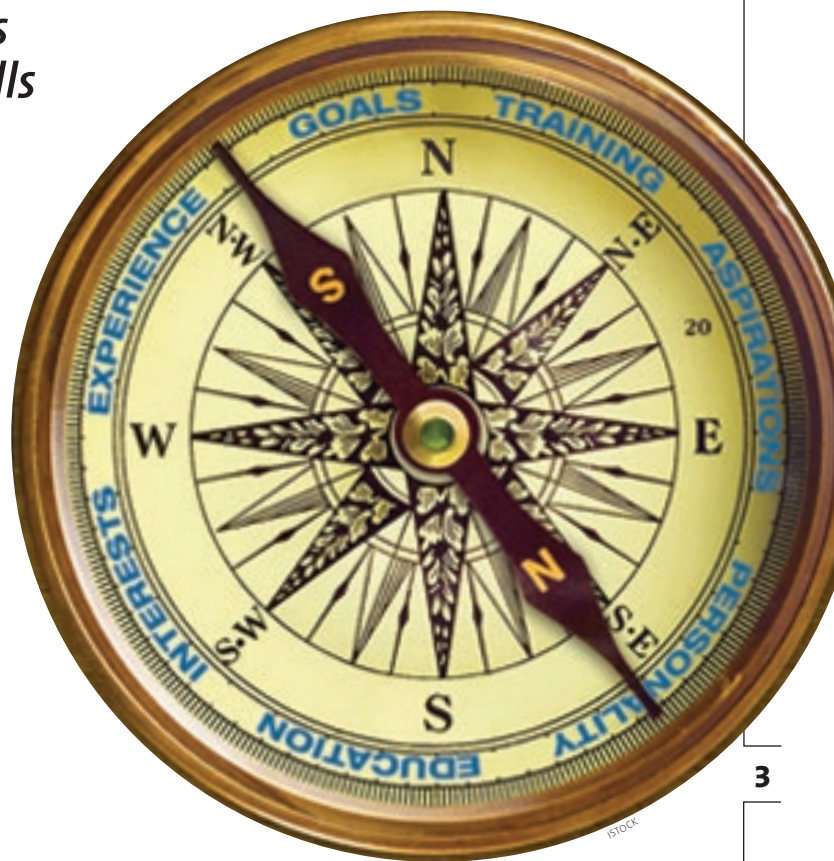
Fortunately, ACS is offering a new series of workshops — ACS Career Pathways — specifically designed to help you get off to a good start. Jointly developed and offered by ACS Careers and ACS Education, these workshops are offered for free to ACS members at national and regional meetings around the country.

ACS Career Pathways begins with a half-day workshop called Finding Your Path, where you can learn about your various career options, and also assess your values, interests, and goals in order to see which type of career is the best fit. Following this introductory workshop, you can choose from four workshops focusing on academic, government, industry, and entrepreneurial career pathways. The third phase of the program focuses on giving you the skills you need to ace your next interview — and begin your new career!

Carrying on a tradition

ACS Career Pathways workshops continue a long tradition of the Society helping members find careers that best match their strengths and needs. According to David Harwell, assistant director for career management and development at ACS, "The Society has been helping new graduates discover career options in chemistry for almost 80 years. We've worked hard to keep up with changing trends, and the Career Pathways workshops take it to a new level."

Created in response to feedback from chemists at every step along the career path, the ACS Career Pathways workshops represent a significant expansion of the career planning resources offered by ACS. For many years, career workshops mainly focused on jobs in industry, since that was where most chemists tended to work.



In contrast, ACS Career Pathways workshops have expanded their scope beyond industry careers to also provide insights for people who are considering working in higher education or government, or going into business for themselves. Another important way the Career Pathways workshops are different, observes Lisa Balbes, chair of the ACS Committee on Economic and Professional Affairs, is their focus on helping participants assess their values, strengths, and interests, and find the employment sector that is the best match.

In short, ACS Career Pathways workshops are your opportunity to learn something you almost certainly won't learn in school: an inventory of your own interests and values, and how they line up with your career choices. You'll also acquire the job-seeking skills, tools, and processes that you will carry with you throughout your career — resources that truly put you in charge of your career.

Eye-opening experiences

Balbes, who helped develop the new workshop format and now volunteers as a Career Pathways workshop leader, notes that early in the Finding Your Path workshop, participants are asked to identify their career objectives. Later, they use a custom-developed survey to rank a list of values according to how important they personally find them.

It can be an eye-opening experience for participants, especially when they compare the results of the values survey with the objectives they wrote earlier in the workshop. “For example,” Balbes observes, “if your most important value is balancing work and family, but your job objective is to be an entrepreneur and start your own company, it might not be a good match. Entrepreneurs tend to spend a lot of time starting up the business, and their personal life often takes second place.”

By itself, the workshop’s values survey can’t tell you exactly which career area is the best fit, notes Harwell. “It’s more of a self-awareness instrument. Based on what the results reveal, we can show you what types of jobs are available on the market. In most cases, there’s going to be more than one match, but also a lot of things that *don’t* match — which can help you avoid a lot of frustration.”

“For example,” explains Harwell, “the value of altruism — deciding to do something because it provides benefits to other individuals and society — is an important value for many people, but not everyone. Knowing how important these values are to you helps you put things in perspective, so you can decide where you really want to go.”

Also in the first workshop, you’ll create your own Career Compass, a tool that you’ll take with you. As you progress through the various workshops, your Career Compass will begin to provide a fuller, more detailed view of where you can go and what your potential is. In fact, says Harwell, the Career Compass is designed

to serve as your own professional development plan, a resource that can evolve with you as you grow in your career.

In the next phase of the workshops, you’ll learn in much greater detail about one or more of the four major employment sectors: industry, academia, government, and entrepreneurship. Each workshop introduces participants to a range of opportunities, both at and away from the bench. Jodi Wesemann, assistant director for higher education at ACS, notes that “participants, who often come with one career path in mind, leave these workshops with a greater sense of options and strategies for exploring them.” Just as importantly, you’ll start getting a clearer picture of which sector and types of positions would be the best fit for your personality traits.

Last but not least, the capstone workshop, Acing the Interview, provides practice in interviewing, résumé preparation, and more. “We spend a fair amount of time talking about formal interviews, where one goes to a company and speaks with an interviewer,” notes Balbes. “But we also talk about informal interviewing — which is basically networking. It’s important to realize that you’re always interviewing, whether formally or informally. We help participants get comfortable with that fact, and learn how to make the most of it.” **irc**



Eric Stewart is a freelance writer and editor living in Arlington, VA.

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Hands-On Help

Career Pathways workshops are designed to give you the insights you need to find your own career pathway — including the type of work environment you’ll find most rewarding and where you will be able to do your best work. They also provide a variety of tools and resources that you can continue to use throughout your career.

The Career Pathways self-assessment tools are a good example, notes Keith Vitense, a professor of physical sciences at Cameron University in Lawton, OK, and an ACS member who is helping to facilitate the workshops. “These tools provide insights that are critical for anyone planning a career, particularly those who are thinking about going directly into industry.”

Attending the workshops can help you identify specific steps you can take now to improve your chances of success. Observes David Harwell, assistant director for career management and development at ACS, “Once you know what your strengths are and where you want to go, you can do a gap analysis and see if there are any missing pieces to fill in. For example, you might find that you don’t have enough experience with a certain type of instrumentation, or are lacking in a soft skill, such as leadership or working on teams. You may still have time to close these gaps before you enter the job market.”

You’ll get the chance to learn about the critical skill of networking, and actually get some practice doing it in a no-stress setting. Evi Llabani, a senior majoring in chemistry and biology at St. John’s University in New York City, attended a Career Pathways workshop last November, and is already experiencing the benefits of improved networking confidence and skills.

“Our chapter hosts a lecture series, and after some of the presentations, I’ve gone up and talked with speakers whose talks interested me. But it was only after attending the workshop that I learned that it’s okay to approach them and ask for advice or help beyond the lecture series.”

“One of the lecturers I spoke with was a professor who is also a St. John’s University alumnus,” says Llabani. “Later, I asked if she would help review my personal statement for my graduate school application, and she did. I hope to continue networking with her, as I found her feedback very helpful. I feel fortunate to have met a genuine person who, even though she’s a complete stranger, gave me constructive and helpful advice. I never thought that networking would be so useful so fast.”

READY TO ATTEND?

The ACS Career Pathways workshops are being offered at every national and regional ACS meeting, and there is no need to register — all you need to do is show up. Just make sure to bring copies of your résumé and business cards, if you have any.

Attending an ACS Career Pathways workshop at an ACS national or regional meeting is just one option. If you are interested in the possibility of arranging a workshop at or near your institution in collaboration with your local section, contact careers@acs.org.

If spending four hours thinking and talking about your career at a national meeting seems like too much effort, Harwell encourages you to consider the bigger picture. “You’re spending an average of five years to obtain your degree, but you may spend little or no time specifically planning for your career. I’d suggest that in comparison, four hours is a short amount of time to invest to gain insight that could help you be more successful and satisfied for the rest of your life. You have to take the time to plan for your future — because no one else is going to do it for you.” **irc**

Taking the Lead

How to Give a Winning Poster Presentation at an ACS Meeting

BY LEIGH ANNA LOGSDON

On your mark, get set, go! The countdown is on for preparing your research poster to present at upcoming ACS regional meetings and at the 246th ACS National Meeting in Indianapolis. As a veteran ACS poster presenter, here are my top six tips for successfully presenting a poster at an ACS meeting:

- 1. Know your research:** Although you may have done all of the benchwork, do you understand all the mechanisms and background of your research? If not, now is the time to dig into the literature and, if necessary, seek help from your advisor to understand the reasoning behind each of your laboratory steps and the larger picture of your project.
- 2. Boil it down:** Prepare your “elevator speech,” a 60-second summary of what you did, why you did it, and your results.
- 3. Practice, practice, practice:** You should practice your elevator speech to yourself, lab mates, friends, and family. It can also be helpful to present it to people without a chemistry background. For example, a group of middle school students were touring our new science building, and their teacher asked me about my research. To explain my work with protein affinity tags to the students, I talked about eating a bowl of Lucky Charms. Whenever you eat a bowl of Lucky Charms, I explained, all you really want are the marshmallows; this is analogous to my research because we want to pick out specific proteins from a mixture. Bazinga! The kids understood my research! Practice your elevator speech to others, and you will be prepared for whomever walks up to your poster.
- 4. Design your poster:** The key to a great poster is a single, cohesive story summarizing your research project. Show the key results that support your conclusion and demonstrate the originality of your work.
- 5. Dress for success:** Potential employers and graduate school recruiters come by the poster sessions, so you want to look professional and confident. For both men and women, I suggest going for solid colors for tops and black or blue for pants — a conservative and classic look.


For men: Black pants or slacks, a button-down shirt (long-sleeve), and a tie is ideal. Also, nice brown or black shoes are important — ditch the sneakers for today.

For women: The best combinations are black pants or skirt with a nice shirt (short- or long-sleeve) or a dress that is close to knee-length, with hose. It's important to not wear anything that is too clingy. You want your work to be on display, not your figure. Also, low heels (no taller than 2 inches) or flats are best. You will be standing and walking all day.

6. Print business cards: Now that you have practiced and look the part, you should be prepared to share your contact information. Don't be afraid it might bust your budget — you can get 250 cards custom-printed at Staples for as little as \$6!

To make sure you're ready to go, here's an ACS National Meeting Poster Presenter checklist:

- ☐ Note cards to practice your speech
- ☐ Hotel and flight itineraries
- ☐ Professional attire
- ☐ Poster (seems obvious, but double-check!)
- ☐ Flash drive (with the digital files for your poster on it)
- ☐ Printed materials (your poster number, confirmation, etc.)
- ☐ Business cards and a portfolio with copies of your résumé
- ☐ Pen and a notebook (who knows when inspiration could strike!)
- ☐ Camera.

For more, check out Brent Znosko's ACS Webinar, Tips for Creating High Impact Scientific Poster Presentations, at <http://acswebinars.org/znosko>. 



Leigh Anna Logsdon is a senior biochemistry and molecular biology major at Trinity University in San Antonio, TX. She has worked in Dr. Urbach's bio-organic chemistry group at Trinity since her sophomore year. She has published a paper as first author in the *Journal of the American Chemical Society*, worked in the Tirrell group at Caltech during the summer of 2011, presented her work at the 2012 ACS San Diego meeting poster session, and will give a talk at the 2013 ACS New Orleans meeting.





246th ACS National UNDERGRADUATE

Sunday, September 8

8:00 a.m. – 5:00 p.m.	Hospitality Center	1:00 – 2:00 p.m.	Technical Symposium: Tracking Changes in the Brain
8:30 – 9:30 a.m.	Graduate School Reality Check, Part I: Getting in	2:00 – 3:30 p.m.	Technical Symposium: Making Demos Matter
9:45 – 10:45 a.m.	Student Chapter Advisor Coffee Break	3:30 – 5:00 p.m.	Careers in Chemistry: Pharmaceutical R&D
9:30 – 10:30 a.m.	Graduate School Reality Check, Part II: You're in — Now What?	5:00 – 7:00 p.m.	Networking Social with Graduate School Recruiters
10:45 a.m. – noon	How to Be an Award- Winning Student Chapter	7:30 – 9:00 p.m.	Chemistry and the Environment Film Series, Movie TBA

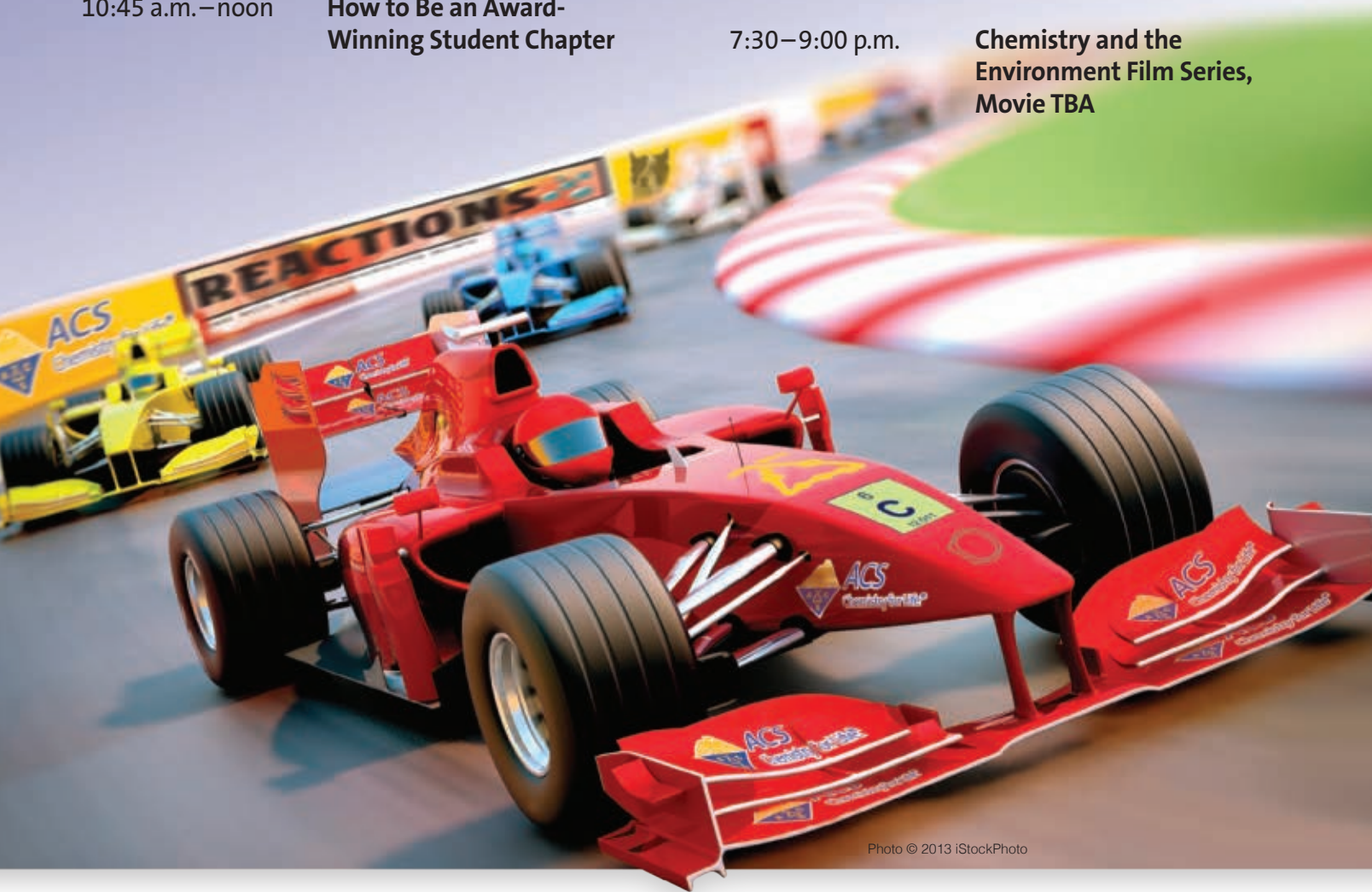


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Meeting PROGRAM



ACS
Chemistry for Life®

Monday, September 9

- 8:00 a.m.–5:00 p.m. Hospitality Center
- 8:00–10:00 a.m. Graduate School
Recruiting Breakfast
- 10:00 a.m.–noon Technical Symposium:
Automotive Chemistry —
What Makes a Racing Car?
- 12:00–1:30 p.m. Eminent Scientist Lecture
Featuring Dr. Attila Pavlath:
“Life without Chemistry?
We Would Be Back in the
Stone Age”
- 2:00–4:00 p.m. Undergraduate Research
Poster Session
- 5:30–6:30 p.m. The Kavli Foundation Lecture

Program format and times are subject to change.
Please consult the final program. All events are
sponsored or co-sponsored by the Society Committee
Undergraduate Programs Advisory Board.

CHAIR: Matthew J. Mio, University of Detroit Mercy, MI.

PROGRAM CHAIR: Carmen Collazo, Pontifical Catholic
University of Puerto Rico, Ponce, PR.

Discover Chemistry in Motion!

September 8–12, 2013
Indianapolis, IN

Explore Graduate School Opportunities

The graduate school events provide great opportunities for undergraduates to network with graduate school students and recruiters representing a diverse variety of graduate programs and to learn about meeting the challenges of graduate schools.

Attention: Graduate School Recruiters!

Network with highly qualified undergraduate students who are interested in learning more about your graduate school programs. Register to participate in the graduate school recruiting events. For more information contact Lori Betsock at l_betsock@acs.org. To register, go to www.acs.org/GradSchoolRecruiters

Getting that GREAT Letter of Recommendation

BY MICHELLE BOUCHER

There is more to getting a great letter of recommendation than simply having good grades. If it were just about grades, you wouldn't need letters; your GPA would speak for itself! Schools and programs use letters of recommendation as a way to go beyond your grades and learn about you as a student and a person. They want to hear about your strengths and weaknesses to help them decide if you would be a good fit for their program.

When I write a letter of recommendation, I try to include as much information about a student as I can. Since letters of recommendation are meant to provide evidence that you will succeed in your desired program or job, the more examples about you that I can provide, the better your letter will be. It is not how much a professor likes you, but rather how well he or she knows you that makes the difference between an okay and a great letter.

A great letter of recommendation will highlight all the ways a student is a perfect fit for a program. It can also put into context any weaknesses that might appear in a transcript; if you struggled in a particular class or semester, a recommender can use this place to explain (with your permission) what happened or how that experience helped you grow into a better student. A letter of recommendation should leave the reader feeling as if he or she really knows the student. It can often be the deciding factor in determining acceptance to a program. So how can you get one of those great letters of recommendation?

Ask someone who knows you well

I cannot say it often enough: letters of recommendation are about more than how you scored on exams. Don't just ask faculty from your highest-scoring classes to write your letter. Ask someone who knows you and can really speak to your strengths and potential.

Be prepared and organized

When you ask for a letter of recommendation, make an appointment with your professor, and expect to spend a little time talking with him or her. Bring with you a list of your potential schools or programs. Good letters of recommendation include discussions as to why the student is applying for the specific job or program, so expect that your recommender will want to know why you have chosen the places you have. Be sure to prepare a list of important information, including deadlines and how the letter needs to be delivered. For example, is it a system that requires your recommender to send in the letter by e-mail, or do you need a paper copy to include in your materials? Does the recommender need to send the letter directly to the school or program? Some recom-

enders like reading admission essays before writing their letters, since it is another way to get to know you better. It would be a great idea to have your essay at least started before your meeting.

Start early

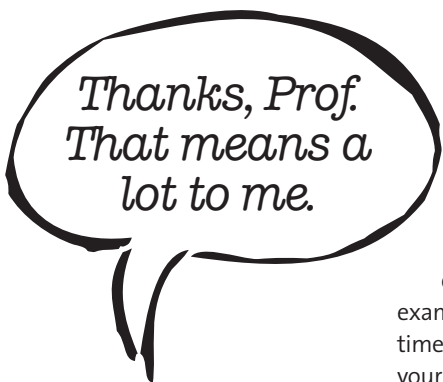
Hopefully you are starting to see that there is more to getting a good letter of recommendation than simply picking a person and sending them an e-mail. Start early — in fact, as early as you can! Approaching your professor a month or two (or more!) ahead of the deadline may seem too early to you, but it really isn't. If I have decided to write a letter for you, it means I believe in you and your potential to succeed in your desired program. I want to take the time needed to write the best letter I can, full of examples of your strengths and how well you would succeed. I might even want to have a follow-up meeting with you to ask for the details that I need to make a strong case for your acceptance to the program. Most professors can, if pressed, produce a letter in a much shorter time frame... but why rush them for something so important to you?

Be a good student

Don't skim past this paragraph! I know that this seems, well, obvious... but hear me out! When I say that you should be a good student, I mean more than simply aiming to earn good grades (which are, of course, very helpful). A good student is also interested in learning material that is above and beyond what is needed for the exam, and is also an active learner who demonstrates his or her interest in learning. Do you volunteer to answer questions? Do you

*Of course
I'll write you
a recommendation.
You're an awesome
student.*





ask questions beyond the “will this be on the test” variety? Do you ever visit during your professor’s office hours? Are you interested in how the classroom material could be applied to real-life examples, and do you sometimes discuss these points with your professor? These interactions provide fantastic evidence, beyond just your GPA, that your recommender can use to prove that you are a good student.

Be involved

The more experience you have in your chosen field, the better the argument I can make that you’ll be successful in that field. It’s just common sense! Tutoring, being part of your ACS student chapter, doing research, attending talks on campus... there are lots of ways to

be part of your departmental community. If you are involved with professional activities outside of campus (such as shadowing chemistry professionals, doctors, or pharmacists), be ready to talk

about these experiences with your letter writer. The more evidence about your suitability for the program or position, the better!

You might notice that many of the things that will help get you a good letter of recommendation are activities that will also tend to make you a better student and future chemist (or doctor or pharmacist). Absolutely correct! If you start early thinking about how to get that great letter of recommendation, chances are very good that you’ll become the type of student who gets those great letters. **irc**



Michelle Boucher is an associate professor of chemistry at Utica College. Between her roles as organic chemistry instructor and co-advisor of the Utica College ACS student chapter, she writes a great number of letters of recommendation each year.

From So-So to Great: Letters in Action

THE SO-SO RECOMMENDATION LETTER

A so-so letter of recommendation will try to be helpful but have very few examples or details, and usually will be very short. There are some standard phrases that show that the recommender is trying to be positive but has to stretch a few facts or impressions into a full letter. For this first letter, Millie Mole is a student who came to class and did reasonably well on her exams, but never asked or answered questions in lecture or lab, and had no other interactions with the professor or the department.

- “She seemed to be prepared for class and appeared to enjoy the subject matter.”
- “Millie works well with her partner in the laboratory section of the class, and I believe that she would function well in a team setting.”
- “From everything I know about your program, it seems likely that it would be a good fit for Millie.”
- “I have no reservations in recommending Millie Mole to your school.”

THE GREAT RECOMMENDATION LETTER

A great recommendation letter offers a number of specific examples to support the points the recommender is trying to make. When backed with details, the recommender can be a real advocate for the student and make a strong argument about why the student deserves to be considered for the program. For this second letter, Millie Mole is a student who was active in class, spent some time talking with her professor about her future plans, and was also involved in the department.

- “Millie Mole did very well in my class and was always completely prepared to engage the day’s material; she came ready to ask questions and reference the readings, and was quick to respond when I asked a question of the class. Millie worked hard outside of class and often attended my office hours to ask for clarification of a lecture point or get help on a particularly tough homework problem.”
- “Millie is a cheerful and helpful presence in the department, as well as being a natural leader. For example, Millie took the lead and organized an outreach event for the ACS student chapter. She dealt with the challenges of organizing a trip to a local second-grade class, including...”
- “Millie is also an effective tutor for the department, and twice a week she helps the general chemistry lecture students work through homework problems and teaches them with cheerful patience. Her experience with these students will transfer well into a graduate teaching assistantship position, and I know she will do well as a graduate student instructor.”
- “After performing research in our department for the past year, she understands the joys and challenges of laboratory work. Millie has been very successful in the laboratory and has learned a number of skills working on her project, including...”
- “Millie has spent a great deal of time considering her post-graduate plans, and is certain that she wants to attend your graduate school. From all our conversations about your program, I know that it would be a great fit for Millie since...”
- “I am delighted to recommend Millie Mole to your school, and I am certain that she will be a credit to your program.” **irc**

Who Are You Online?

Using Social Media in Your Job Search

BY LISA M. BALBES

Linked

Did you know that 90% of all recruiters go online first when searching for new candidates? Unless you've made an effort to develop a professional online presence, you are virtually invisible to these recruiters.

It's important for your career to make sure your online persona includes your professional side, in a way that makes it easy for a potential employer to find you. One of the best ways to do that is to use LinkedIn.com.

What is LinkedIn?

LinkedIn is a business-related social network for professionals — think of it as Facebook for your colleagues, not your confidants. It is the first place most recruiters and hiring managers go to when they are looking to hire someone. If you are looking for a job, or plan to ever look for a job, you need to be there. Your LinkedIn profile is very likely to be your future employer's first impression of you.

10 Creating your profile

Start now by creating a LinkedIn profile and filling it in as completely as possible. Keep your profile updated as you gain experience through research opportunities, club and other volunteer efforts, leadership positions, and employment experience.

If you have a good résumé, you can start by copying and pasting sections from that into LinkedIn. Employers search LinkedIn profiles for keyword nouns (chemist, manager) and verbs (analyzed, managed), so make sure to include both in your profile. To get ideas for keywords to include, search the job boards until you find 10 or 15 positions that are right for you. Then, look at the keywords used repeatedly in those ads, and work them into your own profile.

Next, make sure you have a good photo that conveys and enhances your image as a professional. Use a professional quality headshot with a simple background and good resolution.

The "Summary" section of your profile should sum up in one to two paragraphs your experience and the value you offer to a potential employer. It should describe your skills and areas of expertise.

LinkedIn makes it easy for others to say things about you — using recommendations. Recommendations are like reference letters, but they are posted on your LinkedIn profile and are associated with a particular job. You should have a few references to give you credibility, but not so many that it becomes overkill (5–8 is a reasonable number). Ask colleagues to write a recommendation for you while you're still in a position, while they best remember your accomplishments. You can't edit what they write, but you do determine whether or not to publish it on your profile.

Finally, add a headline — the 120 characters that describe you. The headline is attached to your name whenever you send a connection request, post in a discussion group, or show up in a recruiter's search results. Don't use your current job title, and especially don't use "Seeking position." Take some time to craft a succinct statement of who you are professionally, and how others should think of you.

Building your network

Once you have a good profile, the next step is to send connection invitations to your professional colleagues. You could send the standard invitation, but it's better to spend a few minutes personalizing it for each contact. Start by asking a few close colleagues to connect, and ask them to provide feedback on your profile. Once they have helped you polish your profile, widen your circle and start asking more professional colleagues to connect.

The true power of LinkedIn is that it allows you to mine your network for information by searching not only your direct connections (1st degree) but also all of their connections (2nd degree). Once you have about 150 connections, you can reach someone at almost any company. This comes in especially handy when researching potential employers. You can contact current or former employees who can provide significant insights about the organization.

Use the "People You May Know" tools to expand your network. By importing your e-mail address book, you can invite those already on LinkedIn to join your network. The "Contacts > Add Connections" tab and the "Colleagues" and "Classmates" tabs let you search for people who were at schools and companies at the same time as you and send connection requests to those you know.

The "People You May Know" tab suggests contacts based on your history, and looking through this on a regular basis will provide new connection opportunities.

When deciding to add connections, you can be as inclusive or exclusive as you wish. The strategic way to build your network is to try to connect to everyone that you know. Between current and former classmates, colleagues, fellow volunteers, friends, etc., you have a much bigger network than you realize. If you make a conscious effort to meet new scientists and add them to your network (both online and off) you will be amazed at how fast it will grow.

Seek quality connections. LIONs (LinkedIn Open Networkers) will accept connection requests from anyone who asks. They usually put "LION" in their profile, or put their e-mail address and "invites welcome" in their summary. While you can add a large number of connections quickly, they are not quality connections. Also, if you try to send out more than 50 invitations per day, or if



too many of the people respond to your invitation with “I don’t know this person,” LinkedIn will flag or suspend your account for misuse.

Promote yourself

Once your profile is complete and you’ve started building your network, it’s time to promote yourself. Status updates allow you to tell your network what you’re doing — professionally, not personally. Including links to interesting articles you’ve read recently or “just demonstrated pH indicator for 500 elementary students” are good things to post on LinkedIn. “Just had bacon for breakfast” is more appropriate for Facebook. There is a checkbox that lets you automatically send your LinkedIn status update to your Twitter feed to build your online presence another way.

If you link to your Facebook page, make sure your profile depicts you as the type of employee a company would want to hire. Many people prefer to separate their personal and professional networks and to use privacy settings for personal accounts.

Commenting on other people’s status updates is another way to add value. Set your preferences so you get a weekly e-mail telling you what people have posted, and look for ways to share information relevant to what they’re doing, offer advice (when asked!), or congratulate them on an accomplishment. By paying attention to what others are doing, you not only learn about your field but you also strengthen your professional relationships.

Join groups on topics that interest you — looking at what groups your connections belong to is a great way to find new groups. Once you join a group you can contribute to discussions, browse job postings and the membership list, and more. You can participate as much or as little as you want, but the more you participate the more you will build your network. Adding value to the discussions demonstrates your expertise and enthusiasm for the topic and gets you noticed by others who are also interested in that topic (including hiring managers).

Care and cultivation of your network

While the tools may change over time, networking and managing your professional connections will always be part of your professional life. Just like keeping up on the latest analytical methods, you need to make sure your professional networking tools are up to date.

Export your connections from LinkedIn on a regular basis. The button at the bottom of the Contacts page allows you to download contact info for all your connections, directly into the address book on your computer. You can then add extra notes and other fields that LinkedIn does not track. Having an additional backup ensures

Blogging for Reactions

If you’re looking for ways to increase your professional online presence, consider contributing an entry to Reactions, the blog for ACS student members everywhere (www.acs.org/undergradblog)! Send in an article idea or express your interest in blogging to undergrad@acs.org.

While blogging can’t replace education and experience on a résumé, it can contribute positively to the professional image you convey. Before you post your first entry, here are a few hard-learned dos and don’ts for the beginning science blogger:

DO

- Be yourself and write about what you know. It’s perfectly all right to link your other interests to your work, as long as you do so professionally. And intelligently linking, say, *The Hunger Games* and chemistry demos can be informative and entertaining if done well.
- Edit. Read through that post at least three times before you post it.
- Respond intelligently to your commenters. Blogs enable discourse, and intelligent discourse is a positive thing. Avoid sarcasm.
- Cite generously, and link to the source. Give credit to others for their ideas and photos. Referring to multiple sources bolsters the point you’re trying to make and forces you to read widely. Try to limit your sources to news outlets and credible websites.
- Focus on professional topics. Avoid topics relating to religion, politics, sex, or other controversial issues.
- Write short paragraphs (3–5 sentences) to make your point easy to follow and fun to read.
- Use lots of interesting pictures.
- Focus on the experience you’re getting. Don’t focus on the number of visitors your post brings. It’s just a number.

DON’T

- Mistake opinion for fact.
- Write when angry or on topics that make you angry. This could give the impression that you are negative or short-tempered.
- Give away your e-mail address or phone number or post photos of your location or family.
- Respond to nasty comments. Delete them and then forget them. Nasty commenters, or trolls, tend to frequent high-profile sites and leave smaller blogs alone.
- Post anything personal; avoid blogging about boyfriends/girlfriends, family, friends, enemies, frenemies, or drama of any sort. **irc**

you will not lose all the information, and that you always have access to it.

By making connecting with others, both online and off, a priority in your professional life, you will greatly enhance your professional opportunities. Whenever you meet someone at a conference or lecture, exchange business cards, and then invite them to join your LinkedIn network. You will be amazed at how fast your network will grow — and the benefits it will bring throughout your career. **irc**



Lisa M. Balbes, Ph.D. of Balbes Consultants LLC, is a technical writer/editor and author of *Nontraditional Careers for Chemists: New Formulas for Chemistry Careers*, published by Oxford University Press.

Surviving Your First Year of Graduate School

BY SHANNEN LEE CRAVENS

Welcome to graduate school! That sentence alone can seem a little daunting, so let it soak in for a minute. You have decided to continue down the path of scientific research — a road that could be difficult to navigate if you are not entirely sure of what to expect. Take it from me: I have just gone through it myself and know first-hand that the first year can be intimidating, but it is by no means impossible. After all, there's a reason you got into graduate school in the first place, right?

A new academic family

Undergrad life has become the norm for you — but your world is about to change. This can be a very sobering fact — even if you're eagerly counting down the days to graduation. So how do you adjust to being surrounded by a new group of students, faculty, and staff who see you as an educated professional?

Well, for starters, it helps to put yourself out there... and get to know your new colleagues a little! Every department has its own personality, so the sooner you acquaint yourself with the dynamic and find your niche, the sooner you will start to feel more comfortable.

Do not write off departmental social events as a waste of time. First of all, these events typically have free food, so they can be great ways to satisfy the graduate student craving for a free meal! Second, these are excellent opportunities to meet students and introduce yourself to the faculty in a relaxed and informal setting. This might be intimidating at first, but what's scarier: talking to a professor when they're in the middle of a PowerPoint presentation, or chatting with them over a hamburger? Keep an eye out for social events, happy hours, and community service opportunities that might help you start to feel at home.

Clearing your academic hurdles

Graduate programs all have their own unique requirements, but there are some standard hurdles that you will need to jump over no matter where you decide to go.

Comprehensive exams — These typically come in three flavors. They may be grouped together at the beginning of your first year, at the end, or after you take your candidacy exam. These exams will help to solidify your place as either a doctoral student or a professional with a Master's degree. The thought of taking comprehensive exams might seem intimidating, but really they are designed to help you be successful. The consequence of being required to take classes if you do not perform well on the exams is meant to bolster your knowledge base. Maybe you decided to



switch fields like I did; if so, taking classes will be a way to make up for the ones you did not take as an undergrad. If you have to retake a class you passed years ago, keep your chin up! You took a lot of courses over the past four years, so it is not ridiculous to think you might need a refresher. Buckle down and take these preliminary exams seriously. See this as an opportunity to better understand your field.

Classes — For most of us, undergrad was a time when we strove for the top score, because our GPA was the definition of our success. In graduate school, it's different; doing well in classes is important, but not if it comes at the expense of your research. Take your classes seriously enough to do well and fully absorb the material, but do not obsess over getting that "gold star."

There are other requirements, such as research proposals and seminars, that will crop up along the way, but typically you are spared such stresses during your first year, so do not dwell on them. Know which hurdles await you down the road, but keep your eye on the ones immediately in front of you. Otherwise, you will find yourself tripping early on.

So many labs, so little time!

You are about to join a department with numerous faculty to choose from, so how do you make the right choice of thesis lab? Here's some advice to help you make an informed decision.

Lab rotations — The benefit of this kind of program is fairly obvious: you get to

The author drew this caricature of the James Stivers lab group at the Johns Hopkins University School of Medicine, which is now her thesis lab. This image also appears on the Stivers lab's website.





experience what it's like to work in the lab! The tricky part about rotations is picking the labs you want to test-drive. I suggest you talk to the faculty involved with each lab and base your decision on which projects are available. I encourage you to see your rotations as a chance to try something completely different. I knew that I was going to join a lab that used nuclear magnetic resonance spectroscopy as an investigative tool, but even so, I chose a rotation in a crystallography lab, just to expose myself to the technique and expand my toolbox.

There can be a couple of downsides of lab rotations. They tend to delay when you eventually join your thesis lab, so it might take you a little longer to get your degree. Also, it can be taxing to start over in a new lab multiple times during your first year. However, the most important thing is that you walk away with a sense of what it would be like to join a particular lab. Here's some advice my thesis advisor gave me: *The success of your rotation is based on whether you learned something... not whether your science worked.*

Quick decision — Some departments do not offer rotations. In such situations, try narrowing down the list of potential thesis labs to a manageable level. To do so, chat with the faculty and students to pinpoint which ones sound the most promising based on available positions and projects — don't be afraid to talk about these choices more than once! Then, dedicate



yourself to regularly attending the group meetings of the lab you choose. This will help you discover how the students interact on a professional level, and also give you a sense of your future working environment.

Regardless of how quickly you must choose a lab, the key things to focus on are the science being done and the lab dynamic. Research is not an easy undertaking, so find a group that suits the kind of supportive or competitive environment that helps you thrive. Do you get along with the PI, and are your conversations about your project productive? Is the PI a micromanager, or extremely hands-off? Does the group have sufficient funding? Does the PI have tenure, or is she or he at least confident that tenure will soon come? Are you being offered interesting projects? Are the students in the lab happy? These are some key questions to ask yourself while you are rotating, or to ask other students if you are just visiting the lab.

First-year trial period

Graduate school is tough — and the first year is definitely one of the hardest. For most, it will involve adjusting to living in a new city with new people, in addition to becoming comfortable in a more rigorous academic environment. Do your best to get to know your department, but also get to know your new home outside of lab. Being happy with where you moved can keep you in good spirits when the academics wear you down!

Also, don't assume that graduating from college means you have to start fresh with a totally new set of friends and colleagues. Keeping in touch with people who know you and support you can help you tackle even the toughest days. This might come as a surprise, but my undergraduate research advisor at the University of San Diego is the person who helped me keep things in perspective during my first year. The fact that she had been through what I was experiencing and knew me so well made her an invaluable part of my support system. The point is, don't be afraid to reach out to people you know if you need some guidance and support.

I honestly think that the best way to survive your first year of graduate school is to view it as an opportunity for you to figure out where your life is headed. Making an adjustment this big takes time, so give yourself the full year to truly experience the change and discover if graduate school is the right place for you. Grad school is something you really have to experience first-hand to get a sense if it is right for you. I think my undergraduate PI said it best when she told me before I moved, "You might discover that you made the perfect choice, but if you don't, remember that there is no shame in deciding that your life should take a different direction."

So take a deep breath, get set, and start tackling one hurdle at a time! **inc**



Shannen Lee Cravens is a second-year graduate student in the molecular biophysics program at the Johns Hopkins University School of Medicine.

Undergrads Prep for Working World

Students Who Choose Industry over Grad School Can Improve Their Hiring Prospects through Internships and Other Training

BY EMILY BONES

ADAPTED WITH PERMISSION FROM *CHEMICAL & ENGINEERING NEWS*, SEPTEMBER 10, 2012, VOLUME 90, NUMBER 37, PP. 51–53. COPYRIGHT 2012 AMERICAN CHEMICAL SOCIETY.

After four years of making decisions such as what dorm to live in or which intramural sport to play, new graduates carrying a hot-off-the-press bachelor's degree must tackle some weightier decisions. The first question to consider is whether to apply for graduate school or wrestle with the challenging job market.

According to the American Chemical Society's 2011 survey of new graduates with a degree in a chemistry-related field, 41% of respondents with a bachelor's degree chose to pursue a graduate degree and the same percentage found employment. Not all graduates who opted to search for a job were successful — 14% reported that they were unemployed, up from 6% just five years earlier (*C&EN*, June 4, 2012, page 36).

Undergraduate students can do many things to prepare themselves to be a tough competitor in the job market, however. Through career services offices at their universities, they can take résumé-writing workshops and seminars on how to compose a top-notch cover letter. But landing a job as a new graduate starts long before spring semester of senior year, when soon-to-be grads start submitting job applications.

Many schools have programs that give students hands-on experience. Some are internal and pair students with professors. In others, students venture outside campus boundaries and gain experience in a lab at another university or in industry.

Timothy Boman, for one, took advantage of opportunities offered by his alma mater. During three summers of his undergraduate career at Hope College (MI), he conducted research. Each summer he did something a little different. In fact, halfway through his program he added chemistry classes to complement his mathematics degree. He ultimately stayed at Hope College a fifth year to complete a B.S. in chemistry and a B.A. in math in 2010.

Boman credits his research in organic chemistry, under Jeffrey B. Johnson, as a major factor in successfully finding a job after graduation. Boman is now a process development chemist involved in cancer drug discovery research at Ash Stevens, a contract research organization in Riverview, MI.

"During my interview, I was able to give a presentation about

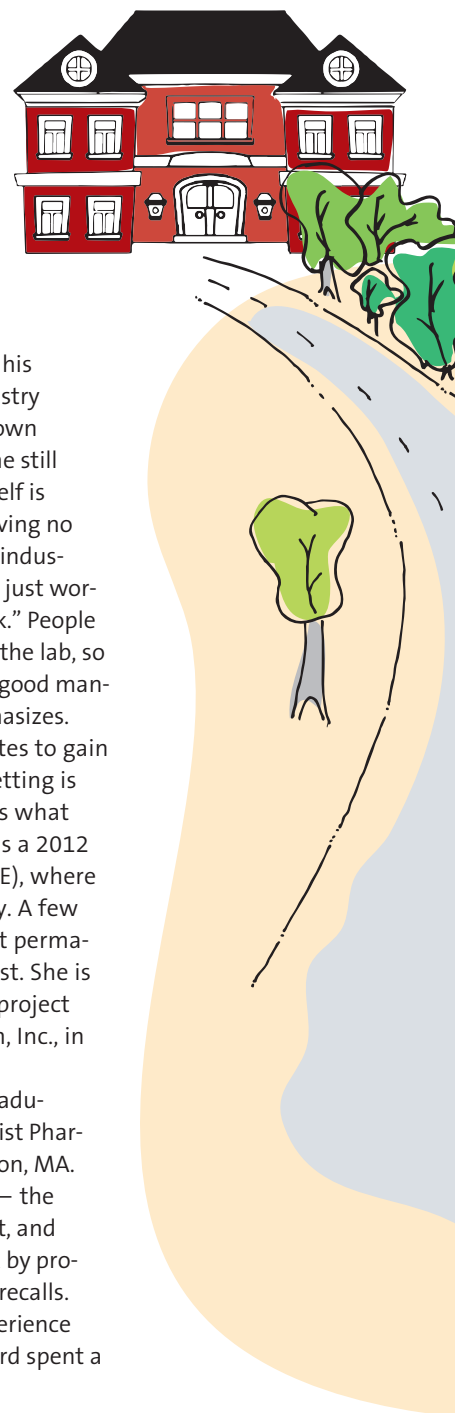
the project I worked on with Dr. Johnson," Boman explains. To get ready for the job interview, he did a mock presentation for people who were working in his advisor's lab group.

Boman learned basic lab protocol, including assembling equipment and manipulating reactions, from his undergraduate organic chemistry research. But once left to his own devices on the job, he found he still had a lot to learn. "The job itself is fast-paced," Boman says. "Having no experience and going into an industrial job, it's tough. You're not just worried about what's in your flask." People will ingest the drugs made in the lab, so it's important to know about good manufacturing practices, he emphasizes.

One way for undergraduates to gain experience in an industrial setting is to find an internship, which is what Jessica Howard did. Howard is a 2012 graduate of Bates College (ME), where she earned a B.S. in chemistry. A few weeks ago she began her first permanent job as a research scientist. She is working on a drug discovery project at Albany Molecular Research, Inc., in Indianapolis.

The summer before she graduated, Howard worked for Cubist Pharmaceuticals, based in Lexington, MA. "I loved my experience there — the people, the work environment, and seeing the impact of my work by producing drug candidates," she recalls.

She also picked up lab experience in an academic setting. Howard spent a



summer doing bioinorganic research at Bates College, and during her senior year she did a yearlong project for a thesis in analytical chemistry under Thomas J. Wenzel. "Being able to form a relationship with a professor who knew me both in the lab and as a student, that gave me a leg up in my interviews," she says.

Having research experience gave Howard the courage to search for a lab position right after graduation. "I love being in lab, so why not do it 40 hours a week?" Graduate school was

a consideration for her, but she "loves the hands-on piece, the actual synthesis," she says. For now, Howard wants to focus on research and not the peripherals that come with being in grad school, such as teaching and taking classes.

Howard did apply for quite a few jobs — for many more than invited her for an interview. "It was definitely a process," she laments. In the end, she was brought in for four interviews and offered three positions.

Her senior research helped Howard get a job, but having the hands-on research experience from the internship at Cubist made her a more skilled candidate, she explains. "I could start working right off the bat, rather than being trained."

Oftentimes company internships are really a summerlong job interview. Such is the view of Watson Pharmaceuticals, a generics drugmaker with headquarters in Parsippany, NJ. "Our entry-level recruiting is focused on the interns," says Celeste R. Chatman, associate director of university relations and inclusion at Watson.

The firm prunes its entry-level candidates by assessing their performance during summer internships. And it only hires interns who are "in the academic program that supports the type of position we're looking to fill," explains Chatman.

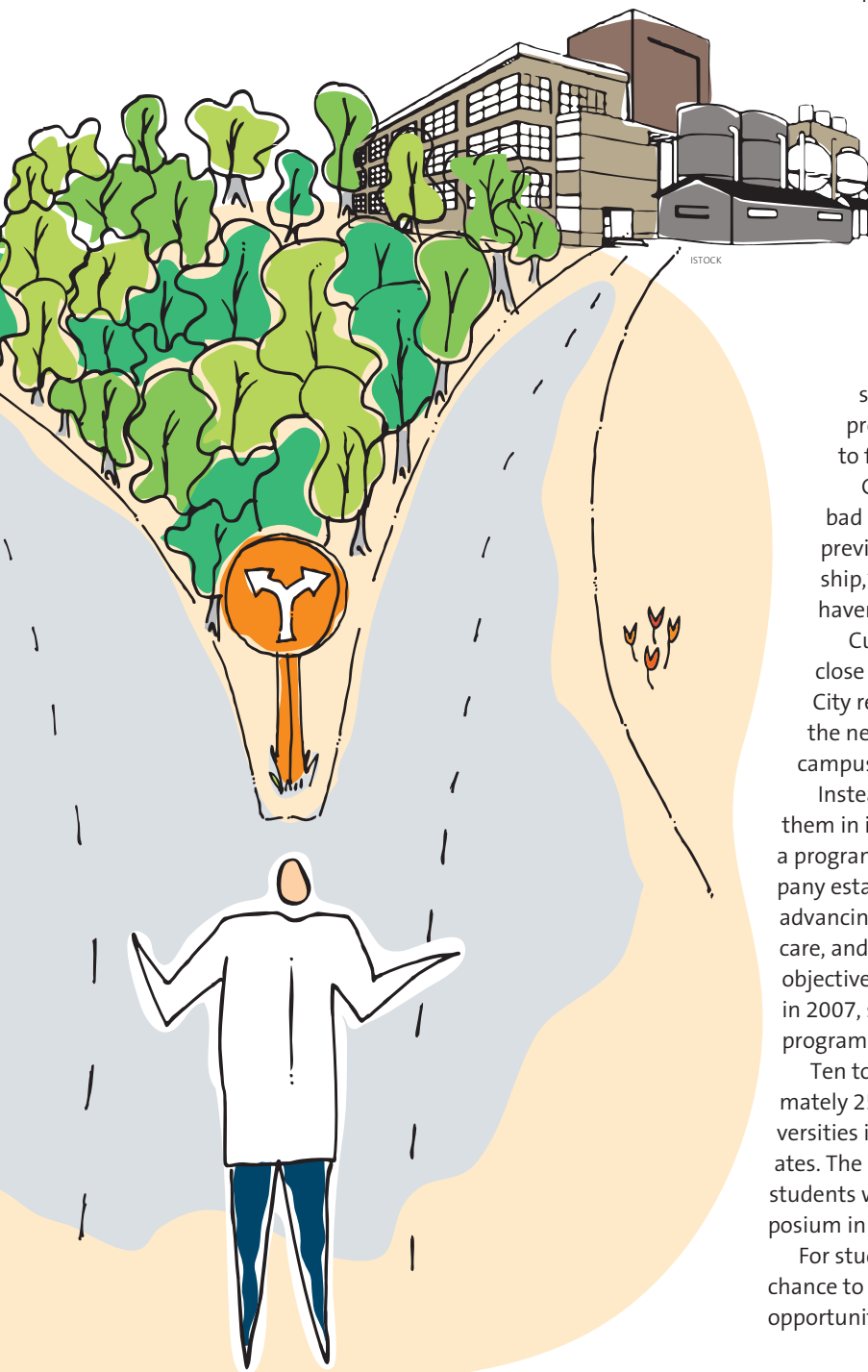
Gaining experience to prepare for an internship isn't a bad idea either. "We like to tap into students who have had previous experience, either in research or another internship," Chatman says. "But I have seen some students who haven't had any experience and who perform well."

Currently, Watson recruits from specific schools that are close to its facilities. For example, the firm's lab in Salt Lake City recruits chemistry and chemical engineering majors from the nearby University of Utah and Brigham Young University campuses.

Instead of taking students out of academic labs and putting them in industrial labs, biotechnology firm Amgen supports a program that keeps students in university labs. The company established the Amgen Foundation in 1991, with goals of advancing science education, improving the quality of health care, and creating sound communities. As part of the education objective, the foundation started the Amgen Scholars Program in 2007, says Scott Heimlich, the Amgen Foundation's senior program officer in science education.

Ten top-tier schools across the United States host approximately 250 Amgen Scholars each year, and three renowned universities in Europe host some 75 participants; all are undergraduates. The U.S. program provides an 8–10-week experience where students work in a lab with a mentor and attend a weekend symposium in Los Angeles in July.

For students at schools with limited facilities who want a chance to try research, this type of program provides them the opportunity. Almost 4000 students from 775 schools around the



world applied to the program this year, Heimlich says, and every year there have been more applications than the previous year.

The foundation has committed \$34 million over eight years to the program. “Essentially it’s fully funded, so your financial status isn’t a barrier to your participation,” Heimlich comments.

“We knew this type of experience — a compelling, hands-on opportunity over the summer at a top university” — could get students excited about science, Heimlich explains. But he

isn’t concerned about whether they ultimately choose a career path in academia or industry. As of *C&EN*’s press time, 140 of the 1050 Amgen Scholars who have completed a bachelor’s degree immediately obtained a science-based industry job after graduation. Most of the scholars — 761 in all — have continued on to science-related advanced degree programs, 19 have taken up science industry jobs after obtaining an advanced degree, and 149 have pursued a nonscience pathway.

Although companies like to see research on the résumés of job applicants, many undergrads don’t seek out this experience. According to the 2011 ACS survey of new graduates, only 17.7% of respondents who obtained a job with a B.A. or B.S. had some kind of summer research experience, 20.5% completed research during the academic year, and 31.5% participated in an internship or co-op experience. These survey categories are not mutually exclusive, notes Gareth S. Edwards of ACS’s Department of Research & Member Insights.

The survey also indicates that the most effective way for new graduates to find a job is through an electronic posting, or through a faculty advisor or another informal channel.

In fact, recent graduates recommend that students seeking a job make use of their connections, for instance by asking those they know if they have heard of any job openings.

“If you know somebody who knows somebody, that makes a difference,” Boman says. He heard about the opening at Ash Stevens through another Hope College graduate. Boman recalls from his job interview with Ash Stevens, “I made it clear I wanted to learn how chemistry works in industry. I wasn’t just doing it for the money or because I was bored. I actually wanted to learn.



Howard, seen here with a snow chemist she helped construct at Bates College, now does research for Albany Molecular Research, Inc.



Through his connections at Hope College, Boman landed a job at Ash Stevens.

I think that helps.”

“Don’t be afraid to seek help from professors,” Howard advises. “Even in terms of, ‘What do I wear? They say it’s business casual; what is business casual?’ ”

Friends and colleagues can also pass on insider tips about the application process. For instance, it’s never too early to start the job hunt. Howard began her search in February of her senior

year; Boman also began his search during the spring semester. If he had it to do over again, he admits, “I would have started earlier, and I would have taken my time a little bit more. I felt like I needed to get a job right away.”

Another tip: Howard found that most companies that interviewed her didn’t ask chemistry questions until she was invited back for the second round. “A lot of times the first question was, ‘How did you hear of us?’ ” In other words, companies want to know how applicants have gone about the job hunt.

When interviewing, Boman and Howard recall that it wasn’t just their research experiences that made them stand out. Leadership, organization, and communication skills were traits they both highlighted throughout the process.

In evaluating job applicants, “we’re looking for future leaders,” explains Andrew S. Zalusky, Dow Chemical’s R&D strategic recruitment leader. Valuable candidates are smart, talented, and technical, and they contribute to society, he says. Internships and traditional experience are all fine and good, he continues, but it’s those other skills that set a top candidate apart from the rest.

Additionally, the world as a whole is collaborating now more than ever, Zalusky stresses, so international exposure and experience are desirable qualities in a candidate. “It’s a multicultural world,” he notes. “Meaningful time overseas can also be an insight to a candidate.”

When it comes time to spruce up the résumé and get ready for the job search, don’t be phony about it. Zalusky urges, “If you’re going to do something, really do something. And make it meaningful.” **inc**



Emily Bones is a production editor at *C&EN* and occasionally writes for the magazine. Before becoming an editor she was a high school chemistry teacher. She has a B.S. in chemistry and an M.S. in secondary science education, both from the University of Rochester.

Navy's Green Fleet Accelerates Large-Scale Production of Biodiesel Fuel

BY JOHN K. BORCHARDT

Ethanol is the transportation biofuel of choice worldwide, derived primarily from corn and sugarcane. However, with millions of people in the world going hungry, many people have ethical concerns over converting food crops such as corn to first-generation biofuels such as ethanol. As a result, many chemists and chemical engineers are working to develop second-generation biofuels (such as biodiesel) based on other feedstocks. These have the potential to reduce CO₂ emissions and can be blended in higher proportions with gasoline and diesel fuel than today's biofuels can.

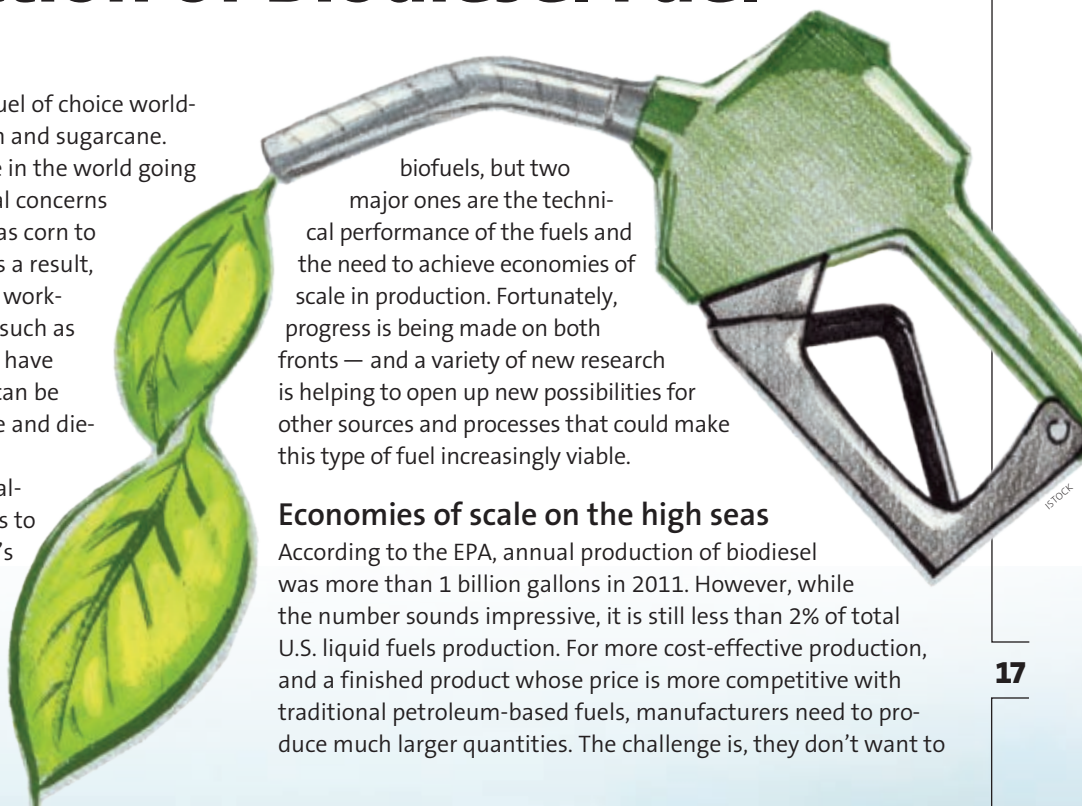
Biodiesel currently is the only commercial-scale fuel produced across the United States to meet the Environmental Protection Agency's (EPA's) definition of an "advanced biofuel." Advanced biofuels are defined as renewable fuels other than corn-derived ethanol that have greenhouse gas emissions at least 50% less than baseline greenhouse gas emissions of conventional petroleum-derived gasoline or diesel fuel.

There are a variety of barriers to the commercial success of second-generation

biofuels, but two major ones are the technical performance of the fuels and the need to achieve economies of scale in production. Fortunately, progress is being made on both fronts — and a variety of new research is helping to open up new possibilities for other sources and processes that could make this type of fuel increasingly viable.

Economies of scale on the high seas

According to the EPA, annual production of biodiesel was more than 1 billion gallons in 2011. However, while the number sounds impressive, it is still less than 2% of total U.S. liquid fuels production. For more cost-effective production, and a finished product whose price is more competitive with traditional petroleum-based fuels, manufacturers need to produce much larger quantities. The challenge is, they don't want to



BELOW: Biofuel is transferred from the supply ship (left) to the guided-missile cruiser *USS Princeton* during the RIMPAC naval exercise. PHOTO COURTESY OF THE U.S. NAVY



produce the fuel on that level unless they're sure someone will buy it.

Fortunately, the U.S. Navy is stepping into the picture, and because of the sheer size of its fuel demands, it may have the potential of "jump-starting" the industry.

Why is the Navy involved at all? According to U.S. Secretary of the Navy Ray Mabus, importing petroleum over long distances "is a very real threat to our national security, and to the U.S. Navy's ability to protect America and to project power overseas." This is because so much of our crude oil is imported from politically unstable parts of the world.

What's more, the Navy has the potential to be a major user of biofuels. The U.S. Department of Defense is the world's largest single consumer of transportation fuels in general, and of the four military branches, the U.S. Navy uses the most: 1.26 billion gallons annually in its ships, aircraft, and ground vehicles. Were the Navy to shift a large portion of its fuel requirements to biofuels, this would go a long way toward creating a large biofuels market and establishing the needed economies of scale for commercial biofuel production for government and private sector use.

point the way to further progress in commercializing second-generation biofuels.

In a March 2012 test, the Navy selected two companies to develop biofuels for use in large-scale tests to find a replacement for traditional diesel fuel. A leading candidate, known as Soladiesel HRD-76, is a 50/50 blend of algae-based biofuel and F-76, the petroleum distillate fuel normally used in the Navy's shipboard applications. Its manufacturer, Solazyme, Inc., uses algae to break down a wide variety of material — from plant matter to household waste — into fuel.

The Navy tested 20,000 gallons of Soladiesel HRD-76 to power the *USS Ford*, a decommissioned guided-missile frigate reconfigured as a remote-controlled test ship, as it sailed from San Diego, CA to Bremerton, WA. The primary goal of the test was to determine whether a 50/50 blend of algae biofuel and standard marine petroleum fuel could be used as a drop-in replacement for conventional fuel without the need for any special equipment or procedures.

Navy Lieutenant Commander Frank Kim explains, "We use the same types of trucks, hoses, and other pier-side equipment to transfer the fuel, and no modifications are required." In addition, the *Ford's* engineers reported that operational performance of the fuel system and gas turbine engines using the 50/50 blend was comparable to operations using traditional F-76 fuel.

Another biofuel being evaluated by the Navy is made from animal fats and wastes. Dynamic Fuels, a joint venture between

Large-scale testing

The Navy is actively testing the performance of biofuels — and several major successes in 2012



PHOTO COURTESY OF THE U.S. DEPARTMENT OF DEFENSE

LEFT: Ray Mabus, Secretary of the Navy

BELOW: Secretary of the Navy Ray Mabus (in blue shirt) on the deck of the *USS Princeton* during the biofueling exercise in July 2012. The tanker transporting the biofuel is to the left.

PHOTO COURTESY OF THE U.S. NAVY



Interested in a Career in Biofuels?

Employment in the biofuels industry, “green collar jobs,” is increasing despite the sluggish U.S. economy. The U.S. Bureau of Labor Statistics, a unit of the federal government, forecasts the growth rate of the biodiesel industry at 31% between 2010 and 2020.

There is plenty of room for production growth — and employment growth — but only if chemists and engineers can improve production economics. A recent economic study conducted by Cardno ENTRIX, an environmental and natural resource management consulting firm, estimates that 2011 biofuel production supported 31,000 jobs, generating at least \$3 billion in gross domestic product and \$628 million in federal, state, and local tax revenues.

CAREER OPTIONS

Possible chemistry career options could be in R&D to improve fuel performance in high-performance biofuel applications in passenger jets, military jets, helicopters, naval vessels, and racing cars, and in less performance-critical fuels such as diesel truck fuel. Chemistry professionals in several fields of chemistry are participating in this research: analytical, physical, bio-, organic, and catalyst chemists, as well as chemical engineers. There are also production jobs. Currently these are primarily in ethanol plants producing this fuel from corn, which is then blended with gasoline. However, the most rapidly growing sector of the biofuels business is producing biofuels from fats or algae, the so-called second-generation biofuels.

Another world of employment opportunities is related to commercial production.

How can the yield of useful feedstocks from algae and raw materials such as chicken fat and non-food crops be increased? Can we find as-yet-undiscovered biofuel feedstocks? Can biofuel feedstocks be expanded to include sewage sludge? All of these questions need to be answered to improve biofuel economics. As pilot plants and commercial-scale production facilities are built, there will be career opportunities for process chemists, engineers, and quality assurance engineers.

Fundamental research is also being performed to better understand the combustion of biofuels. For example, Sandia National Laboratory's Nils Hansen and Lawrence Livermore National Laboratory's Charles Westbrook, in collaboration with international researchers, are using a combination of laser spectroscopy, mass spectrometry, and flame chemistry modeling to study biofuel decomposition and oxidation mechanisms and emissions formation.

While a chemistry or chemical engineering degree often is enough to get you hired, many companies prefer experience in a related field in the chemical and energy industries. In addition to laboratory positions, there is also a need for individuals with management experience to oversee projects and biofuel plants.

START-UP COMPANIES

There are many types of potential employers for chemists and chemical engineers

interested in developing biofuels. Recent and new start-up companies are the best known. The newest ones are often housed in university technology incubators designed to help newly established companies get started.

NATIONAL LABS

A variety of national laboratories and other government laboratories have biofuels development programs. These

include Oak Ridge National Laboratory, Idaho National Laboratory, the National Renewable Energy Laboratory, and the Department of Energy Bioenergy Research Center. The Department of Defense operates laboratories such as the China Lake Naval Air Weapons Station that have positions for civilian chemical researchers.

OIL COMPANIES

Returning to the private sector, several oil companies such as Royal Dutch Shell and BP have biofuels development programs, often through joint ventures with small bioenergy companies or at research institutes they have established on university campuses. Today chemists work in conventional fuel applications such as developing corrosion inhibitors and viscosity improvers. The same sorts of studies would need to be performed for biodiesel, usually through established firms in these technology fields. *irc*



Syntroleum Corporation and Tyson Foods, Inc., supplied this product for the Navy tests. This biodiesel fuel is produced using Syntroleum's proprietary Bio-Synfining product upgrading technology.

The first commercial application is in a plant in Geismar, LA. Using fats and oils feedstock from Tyson and used cooking oil, coupled with Bio-Synfining technology, the plant is designed to produce 75 million gallons per year of ultra-clean and high-performance renewable synthetic fuels. The first facility of its kind in the United States, it began commercial operations in November 2010. The fuel meets strict industry standards, including higher cetane levels with near-zero sulfur and superior stability, and can be blended with petroleum-derived diesel to help it achieve superior environmental and performance characteristics.

The results of these and earlier tests meant the Navy could proceed with the next step in its program: testing of biofuel in the severe operating conditions of a monthlong naval exercise near Hawaii called RIMPAC.

Four of the 42 ships involved in the exercise were designated “The Green Strike Force.” The group included the aircraft carrier *USS Nimitz*, which is nuclear-powered — although its various types of aircraft were all operated on biofuel. The Navy spent \$12 million for 450,000 gallons of biofuel blend for the RIMPAC tests — fuel that, at \$26 per gallon, is still very expensive. However, as Navy Secretary Mabus notes, “This is still R&D. As the market develops, you will see the cost come down.” In fact, this price was already 94% cheaper than what the Navy had paid for biofuel just three years earlier.

Other challenges

There are a variety of other challenges to developing economical, high-performance biofuels. The first set of challenges involves logistics. While biomass resources are located across the country, what is needed is high concentrations of biomass so biofuel production plants can achieve economies of scale that will reduce biofuel costs without shipping raw materials over long distances. A second challenge is developing preconversion technology to reduce biomass physical volume and moisture content. A third challenge is blending different biomass resources — again with the goal of achieving economies of scale. A fourth challenge is biomass conversion, in which chemists working in biorefineries use moderate temperature and pressure to produce stable, consistent fuel products.

Recent research

University scientists are investigating potentially improved process technologies to more efficiently use algae and energy to produce biofuels. For example, Lindsay Soh of Yale University has performed life-cycle analysis of a single-step lipid extraction — a transesterification process using supercritical CO₂ and methanol. Soh evaluated both basic and acidic heterogeneous catalysis to produce fatty acid methyl esters (FAME). Enhanced solubility of FAME compared with reaction intermediates provides a driving force for the reaction, promoting high conversion to the desired FAME molecules.

Another concern is water consumption needed to grow algae. Most of the current development involves growing selected strains of algae in open ponds or closed photobioreactors using various water sources, collecting and extracting the oil from algae, or collecting fuel precursors secreted by algae, and then processing the oil into fuel.

Research reported in late 2012 addresses concerns over freshwater supply for algae production. Stephen Mayfield, a University of California at San Diego professor, reported last November that saltwater algae can be just as capable as freshwater algae in producing biofuels. "Once you can use ocean water, you are no longer limited by the constraints associated with freshwater. Ocean water is simply not a limited resource."

The availability of significant saltwater environments for algae production has been documented in recent years. According to a Pacific Northwest National Laboratory report, saltwater algae can also be grown using saline water from existing aquifers. "There are about 10 million acres of land across the United States where crops can no longer be grown that could be used to produce algae for biofuels. Marine species of algae tend to tolerate a range of salt environments, but many freshwater species don't tolerate any salt in the environment," comments Mayfield.

Additional plants are also being evaluated as raw materials for renewable fuels. For example, Glenn Miller and his co-workers at the University of Nevada have evaluated *Grindelia squarrosa* (gumweed), a biennial flowering plant common to Nevada and other areas of the arid western United States. It appears to be a strong candidate to be a biofuel feedstock, producing an average of 12–23% crude oil by dry weight.



TOP: As part of the RIMPAC exercise, an F-18 jet fighter was powered by biofuel.

BOTTOM: On a voyage from San Diego, CA, to Bremerton, WA, the USS Ford was powered by biofuel.

While most hydrocarbons present in the acetone extracts in this crude oil are at the heavy end of diesel fuel, a methylated B20 blended biodiesel was shown to meet industry standards for flash point, kinematic viscosity, and sulfur content. Gumweed can produce biocrude oil at an annual rate of 60–100 gallons per acre.

Looking forward

Speaking during the RIMPAC tests, Lieutenant Commander Kim said, "It's going to be pretty amazing to see where these fuels take us in the future. This might be the largest demonstration to date, but it is not the last." Given the R&D underway at many industrial, government, and academic labs, fuels used in the next round of tests, which could occur in 2016, may be next-generation versions of today's leading-edge biofuels. *irc*



John K. Borchardt was a chemist, freelance writer, and devoted ACS career consultant for more than 15 years, until his sudden passing in January 2013. He was the author of the ACS/Oxford University Press book *Career Management for Scientists and Engineers*, and also had more than 1500 articles published in a variety of magazines, newspapers, and encyclopedias. As an industrial chemist, he held 30 U.S. and more than 125 international patents and was the author of more than 130 peer-reviewed papers. John's advice, insights, and articles helped countless scientists improve their professional lives, and he will be truly missed. *irc*

SPOTLIGHT

Knox College

Galesburg, IL

COMPILED BY CHRIS ZEIGLER



KNOX

COLLEGE

Chapter co-presidents: Brian Paul & Emma Lorenzen **Number of chapter members:** 23 **Number of ACS student members:** 10
Website: <http://tinyurl.com/knoxchem> **Institution description:** Small, private, rural, 4-year

Q: Do you have any unique positions?

A: Our chapter has a demonstration chair who handles all demonstrations for our events.

Q: In what ways does your chapter give back to the community?

A: We work with local elementary schools and do chemistry-related demonstrations and hands-on activities. Our goals are to increase the students' enthusiasm for science and use the demonstrations to supplement what is learned in class.

Q: What is your most successful recruiting event/method?

A: We recruit members mostly by visiting the chemistry classes and talking to the students about our chapter. This is by far our most useful recruitment method, because if someone is in a chemistry class, they are likely to be interested in chemistry.

Q: What is your most popular or unique chapter activity?

A: We take part in the Umbeck Science-Mathematics Center (SMC) Olympics, a competition between the science clubs on our campus that takes place three times a year. The winning club takes home a trophy and serious bragging rights.

Q: How did you celebrate National Chemistry Week?

A: During NCW, we have a chemistry ball open to the campus and we try to incorporate the NCW theme into the theme and decorations for the party.


Q: How involved is your chapter on campus? What methods are used to attract students to your activities?

A: Our chapter tries to hold at least one event that's open to the campus each term. We attract people to our activities by using Facebook event pages, flyers, and campus-wide e-mails.

Q: Describe a challenge your chapter recently overcame.

A: Our biggest issue is trying to communicate with other clubs that we try to do events like SMC Olympics with. We usually have our members attend their meetings and work directly with them to push forward the collaboration.

Q: What local ACS student chapters have you collaborated with?

A: In the past we've collaborated with Monmouth College and Bradley University. We're looking to do a science demonstration competition with one or both of the schools this year for a trophy and then continue that tradition. 

Faculty advisor:

Diana M. Cermak, 2 years


Q: How did you become a faculty advisor?

Cermak: I've advised the chapter in other capacities over the past 15 years, though primarily regarding community outreach. I officially became the faculty advisor because of a major illness that our long-term faculty advisor was going through. The focus of our chapter was also changing at this time. We officially became an ACS student chapter, which was something I had hoped would happen for many years.

Q: What has been the most rewarding aspect of your service as a faculty advisor?

Cermak: I enjoyed seeing the students have a great time together and the camaraderie of the chapter as students and chemists. It was also rewarding to take a group of students to the ACS national meeting in San Diego and watch them experience a meeting of that scale. It's pretty cool to see so many people interested in and talking about chemistry. You don't get that kind of feeling on a small campus like ours.

Q: What advice can you offer those new to the advisor position?

Cermak: Don't try to be too ambitious right away. Keep the chapter's activities fresh, fun, and on a scale members can manage. We do a lot of outreach in our community. If you try to do too much, it can take a toll on the entire chapter and enthusiasm goes down because students are worn out. Once the group establishes itself, younger students will get involved and the group will grow and be able to manage more activities. Also, make sure you have a group of officers in place that are willing to lead the group and that you can work with. Communication between the advisor and the officers is key to keeping the chapter going! 



The Knox College student chapter is well known in the Galesburg area for its extensive community outreach program.

SPOTLIGHT

Texas State University

San Marcos, TX

COMPILED BY CHRIS ZEIGLER



Chapter president: Ikenna Onyia **Number of chapter members:** 44 **Number of ACS student members:** 20
Website: <http://acstxstate.weebly.com/> **Institution description:** Large, public, suburban, minority-serving, 4-year

Q: How do you ensure a smooth officer transition from year to year?

A: Underclassmen are encouraged to run for office. If all of the officers are graduating seniors, after the end of the year it would be difficult to sustain the chapter.

Q: What is your most successful recruiting event/method?

A: We invite every major to a cookout each fall to attract new students in the chemistry and biochemistry programs. They meet all of the staff and students. We also have a recruitment booth at the beginning of the year, and on our flyers we always mention that "everyone is welcome." We never stop recruiting. Every time people come into the chemistry building there is always a reminder of when the next meeting is. This is what really draws people in.

Q: What types of activities do you sponsor?

A: We organize and sponsor Family Science Nights at local elementary schools several times a year. The topics of these nights vary from food science to oxidation/reduction. We also sponsored a team for the 2012 Polar Plunge — a fundraiser for the Special Olympics. Our president and another member dressed up as Na and Cl, and dissociated when they plunged into the ice-cold San Marcos River. Needless to say, they won the costume competition

and were awarded the prestigious silver plunger!

Q: What is your most popular chapter activity?

A: We have a monthly social meeting. Participants are provided with lunch and they participate in a chemical demonstration and witness and think about a certain aspect of chemistry. This meeting is fun and is the glue that holds everything else together.

Q: What is your most successful fundraiser to date?

A: We sponsor goggle rentals through the departmental stockroom. If a student in a lower-level class forgets to bring goggles, they can rent goggles for the day for \$1. Due to the number of laboratories that are offered, we are able to raise enough money to pay for supplies for meetings and activities, as well as host luncheons and other catered meetings.


Q: What career-related events does your chapter have?

A: We have had various speakers come in to talk with us about their careers. Recent graduates from the chapter also come back to talk to us about their new graduate or work experiences. We have designated an officer position — the graduate president — whose responsibility is to provide more career-related events at our meetings.

Q: Describe a special project the chapter recently did or is now doing.

A: One special project our chapter has done involves green chemistry. We synthesized biofuel from vegetable oil and presented our results at the campus-wide Green Fest in early October. This was added on to last year's group superconductor synthesis, which was also presented.

Q: What innovative methods of communication are used to inform chapter members of chapter activities?

A: We have a "mascot" that appears on each announcement. Last year that mascot was a piñata, which was deconstructed in the final meeting of the year. 

Faculty advisor:

Ben Martin, 6 years


Q: Why did you become a faculty advisor?

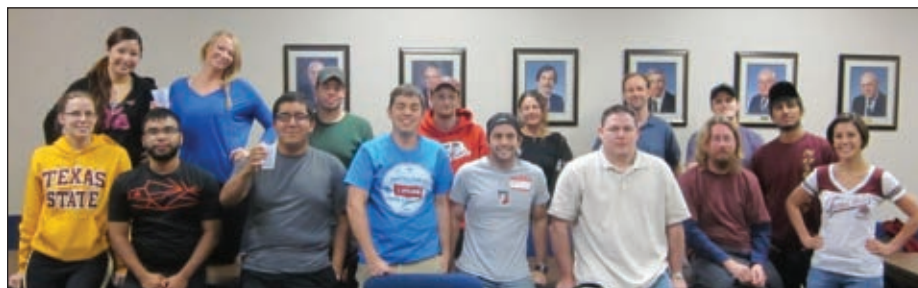
Martin: The ACS student chapter serves a huge role in building and improving the student culture in a department. I wanted to see if I could make a positive impact and help implement new activities and events.

Q: What challenges have you faced in your position?

Martin: It is always a challenge to find the next generation of leaders. Since many active members are juniors or seniors, if one is not careful to recruit younger students the organization can slip into an inactive state.

Q: What has been the most rewarding aspect of your service as a faculty advisor?

Martin: It is always great to see activities work out well, but it is even better to watch students improve their leadership and organizational skills. This is not something that can easily be taught — it has to develop with experience. 



The Texas State University chapter is very career-focused, and it has a designated officer position — the graduate president — who is in charge of providing career-related activities at meetings.

PHOTO COURTESY OF TEXAS STATE UNIVERSITY

SPOTLIGHT

Wichita State University

Wichita, KS

COMPILED BY CHRIS ZEIGLER



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WICHITA STATE
UNIVERSITY

Chapter co-presidents: Sarah Jack & Carmen Gott **Number of chapter members:** 24
Number of ACS student members: 12 **Institution description:** Large, public, urban, minority-serving, 4-year

Q: How do you ensure a smooth officer transition from year to year?

A: Our chapter holds officer elections in April and officially transitions to new officers at the May meeting. The previous officers are expected to work with the new officers over the summer to ensure smooth operations for the next school year. We also maintain detailed computer files and archives for future officer use.

Q: Do you have any unique positions?

A: For the past couple of years the organization has operated under co-presidency. Overall, the co-presidency has been beneficial to the group, allowing the stresses and demands of the presidency to be split equally between two individuals.

Q: In what ways does your chapter give back to the community?

A: Our chapter values service above all other activities. This past year we collaborated with Wichita's children's science center and Wichita's public schools to present science demonstrations to children. When it comes to service, we have found that when we offer our help it is always accepted.

Q: Is your chapter active in the efforts to recruit prospective students to your university?

A: Chapter members guide tours of the chemistry building for high school student groups to create interest in WSU and WSU's chemistry department.

Q: What are some of the interesting ways your chapter retains its members?

A: The most effective retention tool we have found is building relationships. Not only are we an active student organization, we are a peer support

network. These relationships make going to meetings much less of a chore and more of a chance to go hang out with good friends.

Q: What methods do you use to retain members from year to year?

A: Every July we send out personal e-mails to our active members from the previous academic year inquiring about their intentions for the upcoming school year. We have found that personalizing communication is much more likely to garner a response and even increases our retention rates.

Q: What are your most popular or unique chapter activities?

A: Every semester we try to schedule tours of local and regional chemistry-related organizations. This past year we toured Occidental Chemical Corporation (OxyChem) and our local forensic science center. At the end of the OxyChem tour we were invited to apply for chemistry internships offered by OxyChem. We hope to visit again and to build an ongoing relationship with OxyChem. On the forensic center tour, our members learned the importance of gaining hands-on experience with all types of chem-

istry-related equipment and that having this experience is one of the best ways to obtain a job after graduation.

Q: What innovative methods of communication are used to inform chapter members of chapter activities?

A: We use e-mail to remind members about meetings and inform them about upcoming events. Facebook is used when a topic requires discussion. We found that Facebook was especially helpful in creating a collaborative effort when planning chemistry demonstrations. **irc**

Faculty advisor:
Doug English, 4 years

Q: How did you become a faculty advisor?

English: I reactivated the ACS student chapter group that had lapsed before I arrived at Wichita State.

Q: What has been the most rewarding aspect of your service as a faculty advisor?

English: I most enjoy watching the chapter officers take on the challenges of running the group and observing the changes this brings about in them and in the group. Without exception, our student chapter officers have gone on to very promising post-graduate positions.

Q: What advice can you offer those new to the advisor position?

English: The advisor position will be fun and easy if you have a good group of officers. An important first step is to find and recruit students who will be able to lead their peers in engaging and meaningful activities without over-extending themselves. **irc**



In the Wichita State chapter, two members serve as co-presidents and share equal responsibility for leading the chapter.

PHOTO CHEMISTRY

Highlights from a Successful Year of Chapter Activities

COMPILED BY ROBIN LINDSEY



PHOTO COURTESY OF FRANCIS MARION UNIVERSITY

ABOVE: Whether you are a fan of p-chem or seriously are not, the ACS p-chem bumper sticker, displayed by a Francis Marion University student at SERMACS, is always a hot souvenir at ACS regional and national meetings.



PHOTO COURTESY OF MICHIGAN TECHNOLOGICAL UNIVERSITY



PHOTO COURTESY OF TEXAS STATE UNIVERSITY

ABOVE LEFT: Members of the Texas State University chapter recently had great success with their test run of an exothermic reaction using a jack-o'-lantern filled with thermite.

ABOVE RIGHT: A budding young chemist hones his forensic chemistry skills at the Halloween Science Night, a community outreach event sponsored by the student chapter at Southeast Missouri State University.



PHOTO COURTESY OF SOUTHEAST MISSOURI STATE UNIVERSITY

BELOW: Students at Wichita State University (KS) recently toured the research and development labs at Occidental Chemical Corporation, where they were invited to apply for summer internships.



PHOTO COURTESY OF WICHITA STATE UNIVERSITY

LEFT: The Michigan Tech (Houghton, MI) student chapter captured fourth place for its Mole entry in the university's 2013 Winter Carnival Snow Sculpture competition.

RIGHT: The Duquesne University (Pittsburgh, PA) chapter celebrated Pi Day on March 14 by collecting donations for "Pi Your Professor." The four professors who earned the highest donations were "pi-ed."



PHOTO COURTESY OF DUQUESNE UNIVERSITY



PHOTO COURTESY OF MONIQUE WILHELM/UNIVERSITY OF MICHIGAN-FLINT

ABOVE: During the 2013 Battle of the Chem Clubs, held at Michigan State University (East Lansing), students from the University of Michigan-Flint await results from the carbon snake reaction. (See a demonstration on YouTube at <http://www.youtube.com/watch?v=51b3MuOThTg>.)



PHOTO COURTESY OF BARRY UNIVERSITY

Barry University (Miami Shores, FL) students celebrate National Chemistry Week.



PHOTO COURTESY OF THE UNIVERSITY OF TENNESSEE AT MARTIN



PHOTO COURTESY OF BARD COLLEGE

ABOVE LEFT: During Homecoming celebrations at the University of Tennessee at Martin, chapter members creatively display the bounty of their canned food drive.

ABOVE: To celebrate Pi Day, the Bard College (Red Hook, NY) chapter treated students and faculty to slices of pie, and opportunities to make pi orbitals with balloons and watch episodes of "Bill Nye the Science Guy."

BELOW LEFT: The Morgan State University (Baltimore, MD) chapter, including the 2012 Miss Chemistry, participated in the university's Homecoming parade.



PHOTO COURTESY OF MORGAN STATE UNIVERSITY

Boosting Chapter Fundraising Results and Event Attendance

How-to Tips for Creating and Using Flyers to Help Your Chapter Succeed

BY MARISA SANDERS

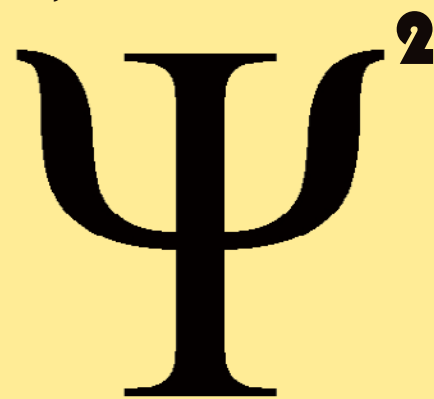
Whether you're promoting your ACS student chapter's National Chemistry Week event, a lab-coat fundraiser, or perhaps a chemistry department potluck dinner, nothing beats a catchy flyer to spread the word. You don't even have to be an artist to obtain attention-grabbing results. By simply paying attention to basic design concepts, you can create pieces that stand out from the crowd. Take a look at the

following foolproof instructions for generating flyers for your ACS student chapter... and watch your events and activities prosper!

STEP 1. FIND VOLUNTEERS

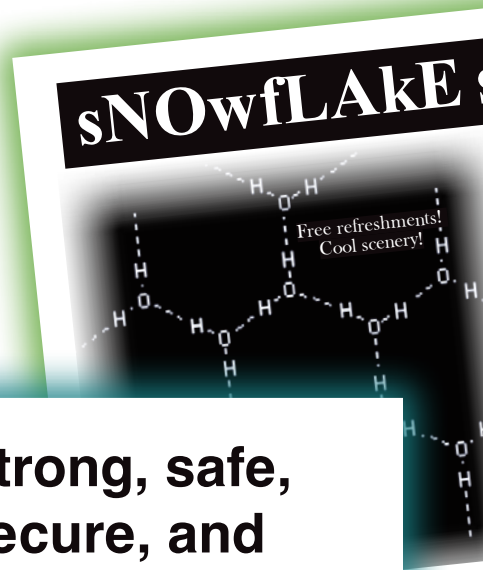
Many members of your ACS student chapter may have certain skill sets outside of the lab. From drawing and Photoshop to photography and modeling, it takes teamwork and a variety of skills to generate a unique and attention-grabbing flyer. If you're

HEY, YOU NEVER KNOW.



PROBABILITY PARTY!

26



Strong, safe, secure, and flame-resistant...

Lab coats!

\$35 for lab coat + name plate
\$10 for only a nameplate

SEE JOYCE IN THE CHEM OFFICE FOR SIZES AND ORDER FORMS.

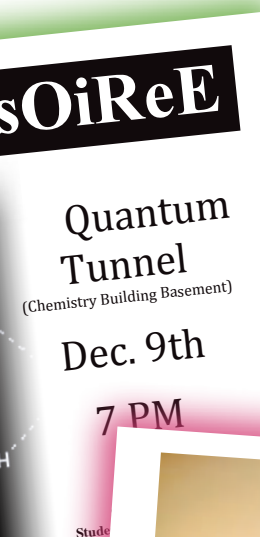
having a lab-coat fundraiser, for example, you could set up a “photo shoot” and create fun and humorous advertisements with the assistance of your student members. You don’t need a cast of thousands to succeed: two or three students could serve as lab-coat models, another could be the photographer, and a small team of students could take on the role of “photo editors.” Once your peers see their friends posing in the lab coats, your products will be easier to market and sell.

STEP 2. FIND A PROGRAM

While Photoshop is probably the most common photo-editing software available, it’s pricey and can be difficult to use. You can create flyers that are just as aesthetically pleasing using Microsoft Word, Publisher, and PowerPoint (or Pages and Keynote, for the Mac users out there). If you don’t have a molecule-constructing program like ChemDraw on your computer, the simple shape and line features available on many word-processing programs allow you to add touches of chemistry to even the most lackluster flyers. With the “shape” function, for example, you can build a benzene ring by simply inserting an oval inside a hexagon. But why stop at benzene when you can construct an entire coronene structure? You can even insert lines within the rings to display resonance! Maybe even place a text box inside the molecule with the name of your event to catch your audience’s attention.

Although experimenting with different font types and sizes can be exciting, you want to choose one that is bold and legible. Consider the following tips:

- ☐ Sans serif fonts (you’re reading one right now), which have no embellishments on the tips of letters, are simple, plain, and easy to read.
- ☐ You want your viewers to be able to read your flyer from about 10 feet away. Have a large headline of no more than five words, centered at the top of your flyer. The headline text should be the largest on the flyer.
- ☐ Your flyer’s message should be simple; it should communicate your message at an almost intuitive level.
- ☐ Add a picture or graphic. Now that you have your viewer’s attention, take advantage of it! Give the viewer something to look at — most people tend to remember a message better when an image is associated with it.
- ☐ Photos should be centered, and they should take up no more than a third of the page.
- ☐ Try to use only one photo. If necessary, you can position two side by side. More than two may leave your flyer looking cluttered, which would detract from its impact.
- ☐ Under the photo, include the time, date, and location of your event. If you’re advertising a fundraiser, be sure to put the price of your product and where it can be bought.



Members of the ACS student chapter at The College of New Jersey channeled their inner Don Draper and had fun creating a humorous ad campaign to drive sales of goggles and lab coats.



STEP 3. BE CREATIVE

Creative events call for creative designs. Do you sponsor an annual holiday party for your chemistry department? If so, you could create an engaging, winter-themed poster by drawing hydrogen bonding in the shape of a snowflake. Scan the drawing to Microsoft Word, add the title of the event, date, time, and place, and there you have it: a chemistry-themed holiday flyer!

Perhaps you're sponsoring a potluck dinner around Thanksgiving. What better way to observe Thanksgiving than by celebrating food chemistry? Indeed, you could create an amusing flyer that depicts chemicals you would expect to see at the potluck, such as beta-carotene (found in carrots), sucrose (in desserts), and tryptophan (in turkey). Feel free to top off the flyer with a border of carbohydrates (found in stuffing). Most of these molecules are available on Google Images.


Does your organization hold game nights every now and again? Why not call them Probability Parties instead? (After all, technically they are.) Add some "quantum chemistry humor" to your advertising by inserting a large Ψ^2 into your flyer.

Recruitment pizza parties are enjoyable in themselves, but providing each party with a unique theme makes them even more special. For example, last fall The College of New Jersey (TCNJ's) ACS student chapter hosted a "CuTe" recruitment pizza party, where ACS student members handed out paper "CuTe" coupons (which spelled out the word "CuTe" with the symbols for copper and tellurium) to the college community at a club fair. Students then turned in their coupons at ACS student chapter meetings to get free wallet-sized periodic tables and slices of pizza. Chapter members also sponsored a "Colors of Chemistry" pizza party

recruitment event, at which chemistry crayons and pizza were distributed. Recruitment parties like these are a great way to get the name of your ACS student chapter out there, spread chemistry awareness, and meet new members!

STEP 4. ADVERTISE, ADVERTISE, ADVERTISE!

You've designed your flyer... and now it's time to distribute it. Some colleges or universities require you to clear all of your flyers with a student activities board before distribution. After approval, print your flyer! Most universities have heavy-duty printers located in the library and possibly in the chemistry department. If you're limited to black-and-white copies, consider printing on colored paper. Print enough copies to cover the chemistry building, and perhaps other areas at your university that have a lot of student traffic. Because hanging up posters can be a time-consuming and exhausting task, it's a good idea to divide up the posters among your student members for posting and handing out.

But why stop at paper flyers when there are many virtual venues in which to advertise your event as well? Create a screenshot or PDF of your flyer and upload it to your ACS student chapter's Facebook page and website. If your organization has a Twitter account, you can even send the flyer as a tweet to your followers. The ideas are endless! Just be creative and have fun with it! 



Marisa Sanders is a senior at The College of New Jersey (Ewing). She is an associate member of the Younger Chemists Committee and previously served as the president of The College of New Jersey's ACS student chapter.

THE COLORS OF CHEMISTRY PIZZA PARTY!

SCA's 2nd Annual SNOWFLAKE SOIREE

Where: **The Quantum Tunnel**
(Chemistry Building Basement)

When: **Dec. 7th**

Time: **5 PM**

Free Pizza, cool scenery!

Sponsored by TCNJ's Student Chemists Association (SCA)

POTLUCK DINNER

Monday, November 19th
C-121
7 PM

Sign-ups to bring a dish are in the Chemistry office

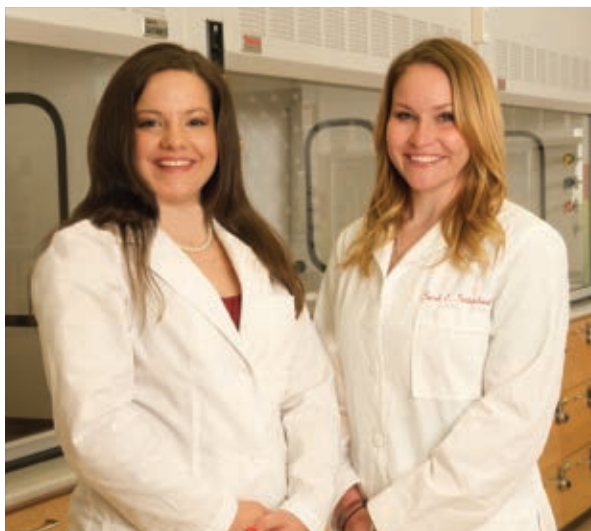
29 63.55 52 127.60

Cu Te

Copper Tellurium

Bring this coupon to SCA's PIZZA PARTY on Wednesday, September 14th at 12:30 PM in P319 to receive a **FREE WALLET-SIZED PERIODIC TABLE OF ELEMENTS.**

Want more? "Like" TCNJ's Students Chemists Association on Facebook!
chemist@tcnj.edu



Kayla McConnell and Sarah Sutherland
Presented their research at the 2012 National Meeting of the American Chemical Society

For more information on TWU's undergraduate and graduate chemistry programs

www.twu.edu/chemistry-biochemistry
940-898-2550

EXPLORE

At Texas Woman's University, we believe a student's place is in the classroom – and the research laboratory. That's why you'll find undergraduate and graduate students working with TWU faculty to achieve real-world breakthroughs in cancer, HIV/AIDS, climate change and other conditions that impact our daily lives. They also present their work at major scientific conferences and win competitive national research internships. Because at TWU, our students aren't just students. They're working scientists, too.



Become a Student ACS Representative to the UNFCCC's COP 19 in Warsaw, Poland

UNFCCC

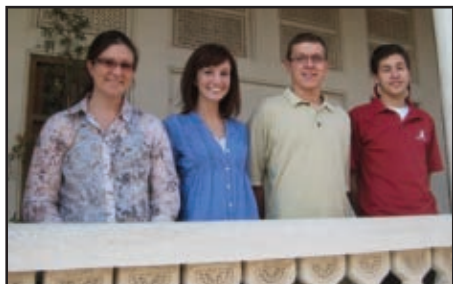


ACS
Chemistry for Life®

The American Chemical Society (ACS) through its Committee on Environmental Improvement (CEI) is providing the opportunity for up to eight students to attend the 2013 United Nations Climate Conference in Warsaw, Poland. Students will receive UN accreditation as official observers representing ACS. The United Nations Framework Convention on Climate Change (UNFCCC) 19th Conference of Parties (COP 19) will take place in Warsaw from November 11-22, 2013. The purpose of this project is to promote climate literacy among college and university students by employing social networking and other media as a tool, and the United Nations as a platform, for discourse and education.

The project sent ACS student observers to COP 16 (2010 Mexico), COP 17 (2011 South Africa), and COP 18 (2012 Qatar).

For COP 19 in Poland, cohorts of four students each will attend either week-one or week-two of the conference.



Save the Planet

by Increasing Undergraduate Climate Science Literacy. The application deadline is July 1, 2013. Application procedures and additional information can be found at <http://faculty.ycp.edu/~gfoy>, click on the link **UNFCCC COP 19 Application** or contact Dr. Gregory Foy at gfoy@ycp.edu.





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