Next Meeting:

Thursday, September 20
Lehigh University

Single Crystal Growth of Nitrides using the Ammonothermal Method

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Location and times: Lehigh University,
University Center, Room 303,
29 Trembley Drive, Bethlehem, PA 18015
5:30 PM Social Hour
6:00 PM Dinner
7:00 PM Program
8:00 PM Business Meeting

Cost: $25.00 (includes social hour); $15 for students and retirees


Directions, parking: http://www1.lehigh.edu/about/maps/drivingdirections/university-center

RSVP: To Mary Roberson at mwr217@lehigh.edu by Sept 10, 2018. Please note LVACS in the subject line.
**Biography:**
Siddha Pimputkar is an assistant professor in the Materials Science & Engineering Department at Lehigh University. He completed his Ph.D. and post-doctoral research at University of California, Santa Barbara working with Nobel Laureate Shuji Nakamura, James Speck and Steve DenBaars. His research focuses on synthesizing bulk and thin film single crystal materials which are decomposition limited at elevated temperatures. Key material systems include nitrides (such as III-N) and oxy-nitrides with a particular focus on enabling new electronic materials and devices for a more sustainable future. An important part of his research is developing novel growth systems which operate at elevated pressures and temperatures. He has been awarded the NSF Graduate Student Fellowship and the DHS Graduate Student Fellowship, while having published 19 papers, 1 book and 1 book chapter on bulk GaN growth. He holds 3 patents with 24 patent applications pending and has been invited to speak at 18 conferences. (Research website: www.pimputkar.org)

**Abstract:** Nitrides form an interesting class of materials with considerable utility though are challenging to synthesize due to the strong N\textsubscript{2} triple bond. Breaking this bond leads to lower standard energy of formation of nitrides and resulting ease of decomposition upon heating of nitride materials. While molecular nitrogen is typically too stable for synthesize of nitrides at temperature below their decomposition temperature, more reactive nitrogen containing species, such as ammonia (NH\textsubscript{3}), can be used.

One particular example of a high-nitrogen-activity environment is the ammonothermal method which uses supercritical ammonia as a solvent and as a nitrogen source for growth of nitrides from solution. This technique is similar to the hydrothermal method which uses supercritical water as the solvent. Challenges of this technique primarily relate to the decomposition of ammonia at elevated temperatures requiring significant pressures to stabilize the molecule. Little has been explored by way of thermodynamic and kinetic properties of supercritical ammonia solutions under ammonothermal conditions and this talk will touch on a study establishing a practical equation of state (EOS) for ammonia under typical ammonothermal conditions (T > 700 K, P > 100 MPa). This EOS is
to calculate the degree of ammonia decomposition under varying conditions and is experimentally verified. Of current technological interest is the bulk, single crystal growth of GaN (Figure 1). GaN is a wide bandgap semiconductor which has received widespread attention as it has enabled the development of short wavelength (UV, blue) optical emitters and promises highly efficient, high power electronics. GaN can be grown from ammonothermal solutions under both basic and acidic conditions through addition of mineralizers: alkali metals or halides, respectively. Important advances will be highlighted and include improvement of growth rates leading to demonstrated peak growth rates of 60—340 µm/day for basic systems and 250—960 µm/day for acidic systems and a reinvestigation of the apparent retrograde behavior of GaN solubility in basic ammonothermal systems. Properties of ammonothermally grown GaN crystals will be briefly presented.

**Fall Meetings**

**October**
Thursday October 18th, 6:00 p.m. to 9:00 p.m.
Northampton Community College
Bethlehem Campus college center 114, Cohen lounge

**November**
Thursday, Nov. 15
Albright College
Dr. Christine Phillips-Piro, F&M College
**Chairs Note**

Welcome to the 2018-19 ACS Meeting year. I hope that your summer activities rejuvenated and rewarded you. As the Section comes into the Fall of 2018 we invite you to participate in several events. Regular meetings - we aim for the third week of the month. Plan on joining us to meet other chemists, do a little networking, and learn about the topic of the month. Then sit back and wait for the topic to hit the big time and say you were there when it was a local. Join us to celebrate our 125th anniversary on October 20 at the DaVinci Center. See the article in this month’s Octagon for the basics. The final details, as well as who to contact with your RSVP, will arrive in your October Octagon and be posted on our social media sites. Finally elections - it’s not just mid terms for congress; your local section holds elections every year. We look for candidates starting in the early fall and the ballot gets posted in late October. Participation by members in governance of the section keeps the section relevant to the needs of the local chemistry community. Getting involved in your section elections allows you to develop the programing in the section, and nationally if you like, to suit your needs, and gives you opportunities to show off your leadership skills. The national society provides leadership training free of charge to members at national meetings and for one member of the Lehigh Valley leadership team at its Leadership Development weekend in January. For additional reasons why involvement in ACS helps you check out the my ACS page at http://my.acs.org/where members share their stories about their involvement in ACS. We look forward to seeing new members in our leadership team.

*John Freeman*

2018 Chair, Lehigh Valley section of the American Chemical Society

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**Scholarship Winner Announced**

The Foundations in Chemistry Scholarship judges would like to announce Brett Berger of Douglasvile, PA as the winner of the 2018 scholarship. Mr. Berger is matriculating to Alvernia University where he plans to major in biochemistry. All of the competitors submitted excellent applications making for a difficult choice. The other competitors, listed below with the school they will be attending, should take pride in their accomplishments. The committee congratulates all of the competitors and wishes them success in their academic pursuits.

<table>
<thead>
<tr>
<th>Student</th>
<th>School</th>
<th>Major</th>
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<tbody>
<tr>
<td>Muhammad Afzal</td>
<td>Penn. State University</td>
<td>Chem. engineering</td>
</tr>
<tr>
<td>Brett Berger</td>
<td>Alvernia University</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Brianna Maslonka</td>
<td>Lehigh University</td>
<td>Chemistry</td>
</tr>
<tr>
<td>Christopher Neff</td>
<td>East Stroudsburg Univ.</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Claudia Stroia</td>
<td>Lafayette College</td>
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LEHIGH VALLEY SECTION CELEBRATES 125TH ANNIVERSARY SATURDAY, OCTOBER 20TH!!

GALA EVENT AT DA VINCI SCIENCE CENTER WILL KICK-OFF NCW AND 2018-2022 STRATEGIC PLAN

In recognition of our 125th year as a section, LVACS has scheduled a reception/dinner and exhibition night in coordination with the Da Vinci Science Center, 3145 Hamilton Blvd. Bypass, Allentown, PA 18103, for Saturday, October 20th, 5:30-9:00 pm. In addition to LVACS members, invitations are being sent to leaders in industry, academia, local sections of other STEM-based societies and local education/health/environmental groups to help us celebrate and to review our new 5-year Strategic Plan. Discussions have begun with some of these leaders toward developing partnerships which can widen our impact on the community through providing chemistry resources for improving education, economic growth, public health and the environment (see the Strategic Plan graphic below). More contacts are needed so please don't hesitate to suggest appropriate leaders/groups!

As part of the event, LVACS groups will sponsor posters and demonstrations at the Da Vinci Science Center from about noon on and admission will be free for attendees. Themes will include 2018 National Chemistry Week, 2019 International Year of the Periodic Table (IYPT) and chemistry research which impacts local health/environmental issues. More format information and guidelines will be provided with event invitations soon!

KEEP WATCHING lvacs.sites.acs.org AND SOCIAL MEDIA [Facebook/Twitter/LinkedIn] FOR DETAILS!!
LVACS Supports in Science and Art Fair

Stroudsburg Middle School (grades 5-7) held a Science and Art Fair on Saturday, May 19th. Lehigh Valley ACS participated (Nigel Sanders, John Freeman, Kelley Caflin) helping student participants and their families learn about polymers by making slime and isolating strawberry DNA. We had a great time at this event (see photos). Well-attended (200+ ; rainy day helped?) and lots of activity at our tables. There were some excellent projects presented by charged-up students/teams: very motivating for us, too! Nigel also co-judged the science projects presented by 20 students with Mr. Joshua Walker, aide to PA Rep Rosemary Brown; Ms. Lorraine Malkowitz, ESU Biology Dept. and the SMS STEM Club Advisor, Mrs. Casey Bodgan. Maureen Madden, PA Rep for the 115th district (Monroe County), presented prizes to the 3 Science Fair winners and 2 honorable mentions as well as the Art project winners. At future events of this type, Lehigh Valley ACS currently supports science fairs through out the region by providing judges, demonstrations and financial support. The section encourages you to participate and report about your involvement in local and regional science events.
Let’s make some slime!

Put on those goggles, please!

So what is the structure of DNA??
Is it groovy?

Squish those strawberries!
NanoMARM 2018

On June 3rd the Lehigh Valley Section hosted 150 conference attendees and 50 high school students for the 2018 Mid Atlantic Regional Meeting and Chemagination competition. Seven oral sessions presented 24 talks ranging from high tech polymer science to the history of chemistry. A particular highlight in the oral sessions was the presence of the local chemical entrepreneur community sharing there knowledge of starting and growing a chemical enterprise.

Oral sessions were followed by a poster session with 75 posters again with a broad range of topics presented. The technical program closed with a plenary talk, The image of alchemy: Depicting chemical change in medieval England. by Dr. J.M. Rampling of Princeton university

Along side the Technical program ran the MARM Chemagination competition. Fifteen teams of high school students from across the region presented their vision of chemical innovation 25 years into the future. Students present their chemistry based ideas about alternative energy, medicine and health, the environment and new materials in the form of a ChemMatters article and present a visual display. These presentations come from Chemagination competitions from the local sections representing the best teams throughout the Mid Atlantic region. As a high school student for information on the Lehigh Valley Section competition in the early spring and earn a trip to Baltimore for the MARM2019 Chemigation competition in early June.

2018-2022 LVACS Strategic Plan

1. 20% of LVACS membership attends at least one event per year.
   a) Hold joint meetings with other local science/technology sections (e.g. AIChE, AIC) and/or hold industry-driven events/meetings.
   b) Hold “BIG” event each year around existing local community activity such as NCW, Earth Day, LV Science Fair (Da Vinci Center), LV mall or sports team community day, etc.
   c) Expand on the annual September networking event to include entertainment which would attract more LVACS members and students.

2. LVACS member communications are current and 2-way.
   a) Track LVACS member participation as judges/sponsors for local K-12 student events.
   b) Use Social Media to generate LVACS member feedback: Twitter, FB and LinkedIn.

3. The LV Community sees LVACS as a resource: Develop Partnerships to Enable.
   a) Press releases and invitations to media coverage of key LVACS events.
   b) Train LVACS teams with ACS “Sparkle” program via on-site workshop.
   c) Hold discussions with select community STEM leaders beginning Fall 2018.
LVACS Elections: Candidates are Needed for these Offices of the Lehigh Valley Local Section of the ACS (election in October/November 2018)
If you are interested in running for any local section office, or wish to nominate someone, please inform Any of the current officers particularly the Current Chair John Freeman jcf2@rcn.com or the Immediate past chair Dr Ceilia Williams lvacscma@gmail.com

Chair-Elect - Serves Jan.-Dec. 2019 Duties of Chair-Elect: Organizes the speaker program for the following meeting year, September 2019-May 2020. Serves as Chair, Jan.-Dec. 2020. Duties of the Chair are to: lead monthly meetings (January, February, March, April, May, September, October, November) coordinate the preparation of the annual report to the ACS. Ensure that the regular activities of the section are carried on. These include publication of the Octagon, Chemistry Olympiad, Chemistry Week, awarding of Scholarships: Foundation in Chemistry Award (high school scholarship), and the Organic chemistry award. All of these activities have committee chairs in place. Calling meetings of Executive Committee as required minimally two a year. Serves as Immediate past Chair Jan –Dec 2021

Duties of the Immediate Past: Chair the Nominations Committee

*Secretary - One-year terms starting Jan. 2019 Duties: Primary responsibility for recording minutes of the regular meetings (January, February, March, April, May, September, October, November). Submits minutes for publication in the section newsletter, The Octagon, and for approval of the membership at next meeting.

*Treasurer - One-year terms starting Jan. 2019 Duties: Handles the financial business of the section in a timely fashion, including yearly submitting a budget in November to the executive, a financial update for each meeting payment of all expense items and accurate record keeping.

*Councilor - Three-year term starting Jan. 2019. Duties: Attends 2 National ACS meetings per year to represent the section at ACS council meetings; travel is partially subsidized by the section. Reports to LV-ACS Executive Committee and general membership on matters of interest and consequence to the section that are presented at the ACS council meetings.

*Alternate Councilor - Three-year term starting Jan. 2019. Duties: Represents the Lehigh Valley ACS section at national ACS meetings when Councilor is not able to attend (see Councilor’s duties above).
All Officers, Councilors and Alt. Councilors serve on the LV-ACS Executive Committee, which meets as needed at minimum twice a year. Candidates must have an interest in providing professional activities for ACS members who reside or work in our local section thereby increasing Lehigh Valley residents’ appreciation of chemistry.

2018 LVACS OFFICERS

**Chair:**
John Freeman
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