

FALL/WINTER 2016

ELEMENTS

The Alumni Magazine of the Department of Chemistry at Virginia Tech

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TELL US YOUR STORY!

Do you have an interesting story that might be featured in *Elements*? Do you know someone who should be featured?

Contact the Department Chair, Prof. Jim Tanko (jtanko@vt.edu) or Laurie Good, *Elements* Editor (laurieg@vt.edu)

Please share your news!

Welcome to the Fall/Winter 2016 edition of the Chemistry Department's alumni newsletter *Elements*!

Per our tradition, *Elements* is a celebration of the accomplishments of the faculty, staff, students, and alumni of the Department of Chemistry at Virginia Tech. We hope you enjoy their stories, and that this publication strengthens the bond between the department and our alums. Rather than reiterate the news and information contained in these pages, let me instead focus on new information and announcements.

The department is proud to announce several new endowed lectureships that will be part of the *Highlands in Chemistry* lecture series. These lectureships were established to enable the department to bring outstanding speakers to the Virginia Tech campus to share the latest, state-of-the-art advancements in the field of chemistry with our students, faculty, and broader university community. Four of these lectures will be initiated in the 2017-18 academic year: The Annabelle Lee Lectureships were established to honor the memory of Annabelle Lee Dessy. During the AY 1966-67 she suggested as an appropriate name for a newly formed research seminar series, "*Highlands in Chemistry*," reflecting the geographic location of Virginia Tech and the wish that the program would reach out to the very best scientists. Created at the urging of the new Department Head at that time, Alan Clifford, the series has now been continuously offered for over 50 years. Lee Dessy also established the tradition of gifting handcrafted wine glasses created by our resident glass artisans to the visiting lecturer. In the first struggling decade of the program, Lee was responsible for all the logistic and fiscal matters and helped ensure the program's success.

Also recently established was the Gladys Yee Peng Memorial Lectureship. Gladys Yee Peng was an elementary school teacher and principal who encouraged young students and dedicated her life to education. This lectureship honors her memory. In 2011 and led at the time by Frank Akers, the Department of Chemistry Advisory Council (DCAC) initiated the James P. Wightman Lecture fund, which honors and recognizes the epic career of Professor Emeritus Jim Wightman.

Finally, as was announced in a previous issue of *Elements*, funds from the Friends of Larry Taylor endowed fund will be used to support the Friends of Larry Taylor Lectureship. This endowed fund was established by the Department of Chemistry Advisory Council (DCAC) in June 2004. The fund honors Dr. Larry Taylor, who was Chair of the Department from 1997 to 2004. Larry also established DCAC in 1998. The fund provides long-term support for a range of departmental activities at the discretion of the Chair. The first Friends of Larry Taylor lecture will be given by Prof. Robert Grubbs (CalTech) on April 28, 2017. Prof. Grubbs received the Nobel Prize in Chemistry for his work on olefin metathesis in 2005. Please check our webpage for more information as the time draws nearer. (Note to DCAC: This lecture will coincide with the Spring 2017 DCAC meeting.)

To everyone reading this... the Department thanks you for your help and support through the years. If you have news, information, or a story to share, please do not hesitate to contact either Laurie Good or myself. And in closing, please have a happy and safe holiday season.

Faculty HIGHLIGHTS

Prof. Guoliang (Greg) Liu was named one of 58 scientists and engineers from across the country to receive a Young Investigator Award from the Air Force Office of Scientific Research. The objective of this program is to foster creative basic research in science and engineering, enhance early career development of outstanding young investigators, and increase opportunities for the young investigators to recognize the Air Force mission and the related challenges in science and engineering. Dr. Liu has been funded to investigate "Nanoporous Carbon Fiber Based on Polyacrylonitrile-containing Block Copolymers: A Hierarchical, Multi-lengthscale."



Prof. Webster Santos and Prof. Kevin Lynch (University of Virginia) were awarded a new 4-year \$2.1M award from NIH to investigate the therapeutic potential of sphingolipids. This grant will enable the

researchers to understand the role of sphingolipids in vivo by developing enzyme and transporter inhibitors of an endogenous signaling molecule, sphingosine-1-phosphate. Their work could lead to drugs that can treat cancer, kidney disease, sickle cell disease, and infections from zika and chikungunya virus.

Prof. Ed Valeev will contribute to a \$10M+, 4-year project funded by the US Department of Energy as part of the National Exascale Computing Project. The NWChemEx team, composed of computational chemists, computer scientists, and applied mathematicians will redesign the popular computational chemistry code, NWChem, to run on the exascale high-performance computer systems planned for deployment after year 2020. The term exascale refers to a billion billion arithmetic operations per second, or a factor of 50 to 100 times faster than the nation's most powerful supercomputers in use today. NWChemEx is expected to serve as the next-generation fully-featured molecular modeling package, scalable from a laptop to the largest computers of tomorrow.



The American Association for the Advancement of Science named **Profs. Timothy E. Long and Joseph S. Merola** as Fellows of the AAAS. Prof. Long was recognized for his distinguished contributions in the field of macromolecular science and engineering, particularly for the synthesis and



characterization of novel polymeric compositions and structure-property relationships. Prof. Merola was honored for outstanding contributions in the area of inorganic and organometallic chemistry and for distinguished service in university teaching and administration. Among his more recent breakthroughs, Merola was part of a Virginia Tech team to discover a new group of antibiotics believed to target staph infections and the antibiotic resistant strains commonly known as MRSA, short for methicillin-resistant *Staphylococcus aureus*.



Chemistry welcomed its newest faculty member this year. **Prof. Feng Lin** holds a Bachelor's degree in Materials Science and Engineering from Tianjin University, and an MSc degree and a PhD degree in Materials Science from Colorado School of Mines. Feng joins Virginia Tech after working for QuantumScape Corporation as a Senior

Member of Technical Staff and Lawrence Berkeley National Lab as a postdoctoral fellow. Prof. Lin's expertise includes energy materials for batteries, smart windows and catalysis, as well as advanced analytical techniques for the *in-operando* characterization of these energy devices at various length scales. His research activities at Virginia Tech focus primarily on electrochemical energy systems, including rechargeable batteries, smart windows, and catalysts for chemicals and renewable fuels.

Virginia Tech and CytImmune Sciences create cancer therapy that reduces chemo side effects

Virginia Tech scientists have developed a cancer drug that increases the effectiveness of a common chemotherapy treatment and dramatically reduces devastating side effects, such as hair loss, nausea, and nerve pain. The new drug uses gold nanoparticles created by the biotech firm CytImmune Sciences to deliver paclitaxel — a commonly used chemotherapy drug — directly to a tumor.

Several years ago, CytImmune asked David Kingston, a University Distinguished Professor of Chemistry, to create a paclitaxel derivative that is bound to a gold-based nanoparticle drug delivery platform, releasing the drug only when it's inside a cancerous tumor.

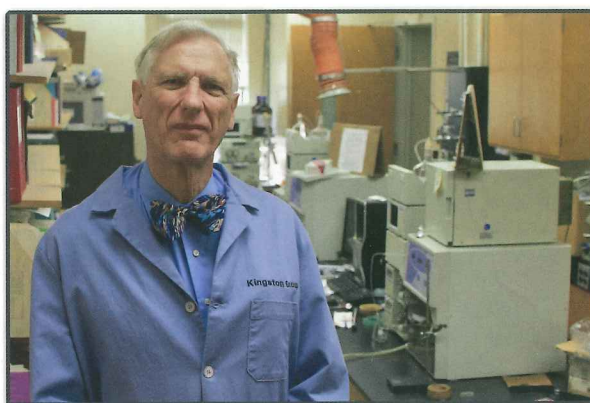
Paclitaxel chemotherapy is widely used to treat breast, ovarian, lung, and colon cancer. "Paclitaxel side effects occur because the drug is given intravenously and thus is distributed throughout the body and not just to the tumor," said Kingston, who joined the Virginia Tech Department of Chemistry in 1971. "In addition, the solvent used to allow infusion has its own toxicity. Paclitaxel could be a much more effective drug if it could be targeted directly to the tumor. This would allow each dose to be given without causing significant side effects and would thus increase the potential for cures." In other words, for now, delivery of a paclitaxel equals a shotgun with pellets. The blast of killing a tumor results in great collateral damage.

Kingston and his team say their delivery method is like a finely tuned rifle, using CytImmune's gold-based nanoparticles as the delivery bullet. The gold nanoparticles are decorated with both paclitaxel and tumor necrosis factor — a cell-signaling protein commonly called TNF. Gold nanoparticles loaded with TNF are known to cling around cancerous tumors. TNF binds to the tumor blood vessel cells, ultimately killing them and reducing the high pressure inside the tumor that normally prevents paclitaxel from reaching the cancer cells.

Now, the slowly released paclitaxel that is bound to the gold nanoparticles can reach its targeted cancer cells to kill them. In early lab tests in treating mouse melanoma, a 2.5-milligram dose of paclitaxel delivered on Kingston's gold

nanoparticles vehicle was essentially as effective as a dose of 40 milligrams of paclitaxel by itself. The delivery method is expected to soon move toward clinical trial, said Kingston.

Findings by Kingston and his team — including Jieli Zhao, a 2016 doctoral graduate in chemistry, now a chemist at Proctor and Gamble, and Shugeng Cao, a former post-doctorate researcher also in chemistry and now an associate professor at the University of Hawaii at Hilo — were recently published in the scientific journal *Bioconjugate Chemistry*.



Zhao and Cao carried out the actual synthesis of the paclitaxel derivatives with the designed linkers to allow them to bond to the gold nanoparticles, with Kingston supervising.

"This approach has the potential to be a game-changer in nanoparticle-based drug delivery systems," said Kingston, "since it combines the power of drug targeting by tumor necrosis factor with the advantages of nanoparticle delivery, including the low toxicity of nanoparticle

drugs to normal, healthy tissue."

"By combining the tumor blood-vessel-destroying activity of TNF with the cancer-killing effect of paclitaxel onto CytImmune's tumor-targeted 'stealth' gold nanoparticles, Dr. Kingston's team and CytImmune's team may have potentially created a new cancer drug that is far more effective and less toxic to the human body," said Lawrence Tamarkin, chief executive officer at CytImmune.

Work on the new drug was split between Virginia Tech's main Blacksburg campus and CytImmune's Rockville (MD) headquarters. Kingston has teamed with CytImmune in the past on tumor-targeting nanomedicine.

Virginia Tech previously used gold nanoparticles in unrelated anticancer research, including at the Virginia-Maryland College of Veterinary Medicine, which in experiments used gold nanoparticles to collect around tumors found inside a dog, and then utilized a non-ablative laser to target the gold nanoparticles, and thus the tumors. In essence, the veterinary approach killed cancer cells by heating them.



Prof. Gordon Yee was selected to receive a College of Science Certificate of Teaching Excellence for 2016. He was cited for his commitment to designing new courses that help students who struggle with chemistry to be successful.

Prof. John Morris is leading a collaborative team of scientists from VT, Emory University, Brookhaven Natl. Lab, Yesheva University, and the Army Research Laboratories to explore "The Catalytic Decomposition of Chemical Warfare Agents." The \$2.6M award from the Dept. of Defense will assist the military in developing materials that trap and then render harmless chemical warfare agents. The Morris Group (including Josh Abelard and Conor Sharp, shown here) was featured in a 8/1/16 VT news article that detailed this important research. According to Morris, "These compounds represent some of the most toxic chemicals ever created, yet there currently are few methods available for safely removing them from the environment. The ultimate aim of our research team is to develop materials that might be incorporated into air filters, fabrics, and gas masks for soldier and civilian protection."



Josh Abelard and Conor Sharp are doctoral students with the Department of Chemistry, both working as part of a \$3 million U.S. Department of Defense project designed to create and test films and materials that can trap and render benign chemical warfare agents.

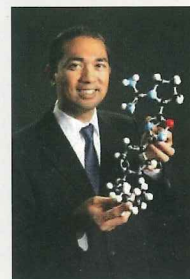
The Valeev Group was awarded a new 4-year \$600K NSF award to develop novel methods for computational prediction of physical and chemical properties of solids and their interactions with molecules. The new award from the Division of Advanced Cyberinfrastructure will bring the predictive capabilities of high-end molecular electronic structure theory to the realm of solids; this will facilitate quantitative descriptions of phase diagrams of molecular crystals, band gaps in semiconductors, and catalysis on metal surfaces. This award is part of a \$1.8M VT-led collaboration with the California Institute of Technology and Northwestern University.



Prof. Valeev was also named a 2016 National Award Finalist for the Blavatnik Award for Young Scientist—a highly competitive program honoring extraordinary young scientists and engineers. Valeev was acknowledged as a pioneer in the development of accurate, many-body electronic structure methods for molecular simulations.



Prof. Webster Santos, in collaboration with Profs. Alban Gaultier and Kevin Lynch at UVA, received pilot funding to study drugs developed in the Santos lab as potential multiple sclerosis (MS) therapy. MS is an unpredictable, often disabling disease of the central nervous system that disrupts the flow of information within the brain, and between the brain and body. The 70K grant from the UVA-VTC neuroscience seed fund program is designed to bring neuroscience investigators together to tackle important questions and perform transformative work.



The Department of Chemistry received the Exemplary Department Award for the THIRD TIME and the SECOND YEAR IN A ROW!
This year the award recognizes the work of programs and/or departments that effectively link research and scholarship with teaching—with a focus on innovative programming.



Congratulations to members of the "Chemically Dependent" volleyball team for their win in the Co-recreational Intramural Volleyball Team championship. Pictured here are Maria Nieves, Gordon Yee, Chris House, Jeffrey Foster, Megan Delene, Kate Hardin, and Shannon Smith (not shown is team member Loren Brown).

Prof. Daniel Crawford is leading the new \$19.4 million Molecular Software Sciences Institute (MolSSI) dedicated to molecular and chemical computational modeling



Prof. T. Daniel Crawford is leading a new \$19.4 million initiative to build a national team of software scientists to design and build new, powerful software tools that can help researchers of all stripes tackle wide-ranging, complex, data-heavy issues, such as cancer, diabetes, and Alzheimer's disease, as well as create new energy storage systems that can help stem climate change.

The Molecular Sciences Software Institute, MolSSI (molssi.org), which was sparked by the White House National Strategic Computing Initiative and is funded by the National Science Foundation, will be housed at Virginia Tech's Corporate Research Center. The Institute will bring new jobs for software scientists and new research opportunities for graduate students in Blacksburg and elsewhere. Much of the funding will

support the hiring of an initial dozen employees, including software scientists, computational chemists, computer scientists, and applied mathematicians—all coming to Blacksburg to develop software frameworks, interact with community code developers, collaborate with partners in cyberinfrastructure, form coalitions with industry and government labs, and ultimately serve as future experts.

"The Molecular Sciences Software Institute will serve as a nexus for science, education, and cooperation serving the community of computational molecular scientists – a broad field including biomolecular simulation, quantum chemistry, and materials science," said Crawford, a specialist in the field of computational chemistry, where computer simulations are used to test theoretical chemical interactions.

MolSSI's co-directors include faculty members from Iowa State University, Rice University, Rutgers University, Stanford University, Stony Brook University, University of California Berkeley, and University of Southern California. Crawford adds that the group will go wider in seeking members to join software-tool building efforts, connecting experts from the United States to those in the United Kingdom, the European Union, Scandinavia, and Japan.

"The Institute will provide international leadership to spur significant advances in software infrastructure, education, standards, and best practices that are needed to enable the molecular science community to open new windows on the next generation of scientific grand challenges," added Crawford. The challenges encompass all aspects of the health sciences with a goal of understanding the chemistry of proteins and how they relate to life-altering diseases, such as cancer, diabetes, and Alzheimer's disease. Other challenges include environmental ones such as creating new materials essential for energy storage. Modeling efforts can cut the long stretch of time that it takes industry to design, build, and test new materials or devices.

The main Blacksburg-based group will be software focused. Use of experimental hardware – supercomputers and clusters and the like – will come from the University's Advanced Research Computing facilities, in addition to burgeoning relationships with private research partners at Cray Inc., Intel Corp., IBM Corp., and Nvidia Corp.

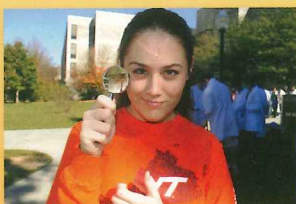
"Daniel's creation of the Molecular Sciences Software Institute demonstrates the College of Science's and Virginia Tech's determination to create broad-based, interdisciplinary efforts by chemists, computer scientists, applied mathematicians, and more, to tackle the problems that vex us, hinder our health, and hurt our environment," said Sally C. Morton, Dean of the College of Science. "By working together and being open to new thoughts and technologies, there is no problem that our scientists cannot solve."



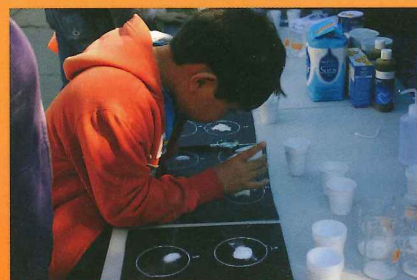
Using methods to be developed under the auspices of the MolSSI, advanced simulations of ion channels in all atom detail can be performed on millisecond timescales to yield insight into basic biophysical questions with implications for biology broadly.

Credit: Matthew Harrigan and Vijay S. Pande, Stanford University

CHEMFEST!

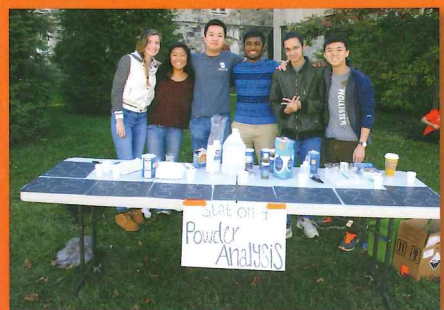


Alpha Chi Sigma, advised by Asst. Prof. Amanda Morris, held Chemfest in honor of National Chemistry Week on November 6th. Local elementary schools were invited to a Sunday afternoon filled with fun exploring chemistry. This year's festival was themed "Solving Mysteries through Chemistry." Guests were able to explore some of the chemical techniques surrounding forensics through each of the seven stations. Urine analysis, blood typing, ink chromatography, and chemical safety demos were just some of options that guests could participate with and learn more about. The fraternity members had a great time



interacting and educating the young minds of our community. The formation of gas station was a big hit with most of the kids. The station illustrated how by adding baking soda and vinegar in a bottle, with a balloon stretched over its mouth, causes a reaction that forms a gas. The gas formation was made visible by the balloon becoming blown up. Parents showed a lot of interest in our blood typing station and were very engaged with our volunteers, as well as with the concepts behind the experiment.

In closing, Chemfest was a wonderful day filled with learning about the exciting field of chemistry — and we thank members of Alpha Chi Sigma for their service to the community -- AND the generosity of CHEM alumni in funding this and other outreach initiatives!



It takes a department to raise a service dog...

Prof. Gordon Yee didn't anticipate being a dog owner this fall, but his trademark generosity of time and social commitment brought Oliver into his home and into Hahn Hall—and by association into the entire department.

When junior Chem major Marissa Milliron (pictured below) agreed to foster a white male labrador puppy by the name of Oliver, she joined 28 others on campus (mostly students) who are volunteering to raise a puppy for the non-profit organization, Service Dogs by Warren Retrievers (SDWR). Unfortunately, her apartment situation proved to be prohibitive and so Prof. Yee agreed to take the leash until she could make other living arrangements. Now, Oliver is a highly visible member of the Chemistry family.

When not in Hahn South with Prof. Yee and other faculty who pitch in with dog-care, ten-month old Oliver can be found many mornings in the main office in Davidson Hall when Prof. Yee is teaching or advising students. Despite the fact that trash cans have to be elevated and out of his reach, toys, snacks, and chew bones made available, and a mid-morning walk around the drill field on his schedule, Oliver has become a smile-inducing member of the main office staff.

A little background: This fall, SDWR started a service dog puppy-raising program at Virginia Tech geared towards college students. SDWR service dogs have the potential to help families and children with "invisible disabilities" such as autism, diabetes, post-traumatic stress disorder and seizure disorders. Today, over 500 SDWR dogs have been placed in homes across the nation. SDWR volunteers foster puppies for 9 to 18 months depending on the puppy's behavioral progress.



Prof. Yee, in fact, is already lamenting the day when he has to hand the leash back Marissa on a permanent basis.

Puppy Raisers are responsible for socializing the dog and teaching general obedience skills such as walking on a leash and obeying basic commands. Unlike the organization's national puppy raising program, the college SDWR programs provide financial assistance in the form of dog food, veterinary care, and other essentials. And in return, students receive a companion, a friend, someone to help them de-stress, or just a cuddle buddy.



Nonetheless, given the huge commitment it takes to see these splendid animals through to adulthood, it's likely that Oliver will continue to serve as Chemistry's official mascot. And 480 Davidson will be well stocked with treats and willing walkers when Oliver pays a visit.

The *Collegiate Times* recently published a story about the program and the impact that VT's canine population is having on campus: http://www.collegiatetimes.com/lifestyle/ut-prosim-canine-edition-service-dogs-take-over-campus/article_4840de7c-9bcf-11e6-a152-1f39f898c9ee.html.

Oliver and all of us in the Department of Chemistry wish you and yours Happy Holidays and a wonderful 2017!



Prof. Lou Madsen on Samsung Note 7 Recall and the Use of a New Ion Gel for Safer and Higher Density Batteries

When **Prof. Lou Madsen** first heard the news that Samsung's Galaxy Note 7 phones were spontaneously self-combusting, his first reaction was *"They could use our electrolytes."* As he suspected, the cause was linked to the phone's battery overheating when in use or when charging. Samsung ended up allowing exchanges or refunds for all Note 7s before discontinuing the phone in early October and issuing replacements, but that didn't stop the problem. Samsung has since stopped production of the phone entirely.

Prof. Madsen believes his research could solve the key battery issues of the Galaxy Note 7, in addition to related problems for a host of other products that rely on lithium-ion batteries. These batteries are at risk for overheating due to the extreme volatility of their liquid electrolytes and the reactivity of lithium. His NSF-funded research (in collaboration with colleagues at VT, at UNC, at Penn State, in Australia, and in the Netherlands) may lead to a commercial solution for this serious problem.



Madsen and his graduate student, Ying Wang (pictured above), are currently investigating the potential of "ion gel" electrolyte materials, which feature a burning point much higher than liquid-based Li-ion batteries. "One of the important properties of it is that it is totally non-flammable," Madsen said when explaining an important advantage of the product he is developing. In thermal testing, lithium-ion batteries begin to degrade around 80 degrees Celsius; in contrast, Madsen's product will operate up to 300 degrees Celsius before degrading. The components of this material are so low volatility that you can actually aim a torch at it and it won't burn.

The ion gel he and his team are developing is held together with a super strong polymer that is similar to Kevlar®, the material used in bulletproof vests. That's what enables it to withstand extreme heat, while the ion gel also plays its role as an extremely good conductor of electricity (ions). Furthermore, the gel can be made very stiff, which can allow for Li batteries that are up to three times higher energy

density than the best commercial batteries now. Madsen explained that it's similar to "a translucent solid... and it's flexible, and it sort of feels a little bit like licorice ... and you can mold it into different shapes or films."



Ying inserting an ion gel sample into the NMR spectrometer for analysis

All of these features make this new substance a possible game changer. Not only could the lighter, longer-lasting batteries extend the distance electric cars could travel on a charge,

but it could also figure into medical devices like pacemakers, which would have to be changed less often, and even for artificial limbs for humans and artificial muscles for robots. It could also play a role in long-term storage of solar and wind power.

The last primary obstacle for the product before companies may incorporate it to replace their lithium-ion batteries is to see how the product interacts with other materials. Companies need to be sure that besides having properties better than traditional lithium-ion battery materials, this new product can function well with other materials in a battery and not chemically degrade after many charge/discharge cycles. Although, such a battery must be proven to work reliably and correctly prior to commercial use, Madsen remains confident that his product will find its way into consumers' pockets, homes, and vehicles in the future.

Indeed, it's been suggested that this new type of gel the team created could revolutionize the \$48B battery industry, and Madsen is currently communicating with companies about the applications potential of his research. "I think there's a decent chance we could get this into real batteries"—although it could be a while before the product finds its way into consumer cell phones. "Three to six years. If everything went well it might be three to four years, but if there are more problems to work out then it could be six, eight or ten years," Madsen said.

Immediately following the Samsung recall, Prof. Madsen's phone began ringing off the hook. He has since been interviewed by NPR (twice), VT's Collegiate Times, VT News, and two Roanoke area and VA state news affiliates (WDBJ-7 and WSLs television). Links to these interviews (and the technical article published in the journal *Advanced Materials*) are provided in the online version of this issue of **Elements** at www.chem.vt.edu.



Dr. Chris Curfman (VT BS degree and an MS with Prof. Richard Gandour) was recently featured in the 8/5/16 issue of *Atlanta Business Chronicle* for both his legal and skateboarding talents. After earning his PhD in organic chemistry at Emory University, Chris became an attorney specializing in patent prosecution and litigation in chemical technology and biotechnology. He has also

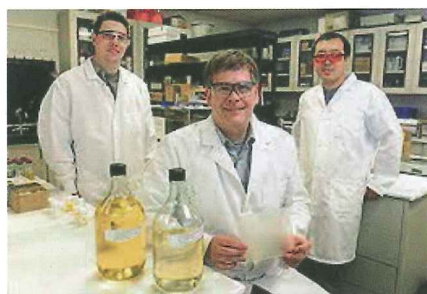
served as a member of DCAC, the department's external advisory committee. Chris remains an active alum and Hokie supporter in the greater Atlanta area (picture courtesy of Joann Vitelli).



Two of the American Chemical Society's 2016 Class of ACS Fellows are Chem alums and members of DCAC. **Prof. Joseph Thrasher** of Clemson (BS and PhD from VT) was

recognized for outstanding contributions in the areas of sulfur-fluorine chemistry, halogen exchange chemistry, and tetrafluoroethylene-based molecular and macromolecular chemistry and for excellence in leadership at the departmental level in academics.

Prof. Dean C. Webster from North Dakota State University (also a double Hokie with his PhD under the direction of the late Prof. Jim McGrath) was recognized globally as an expert in the synthesis of polymers and resins for functional and sustainable coatings. Also recognized as a leader in the field of high-performance materials, including bio-based thermosetting



The Society of Chemical Industry (SCI), America Section, awarded the 13th annual SCI Gordon E. Moore Medal to **Dr. Abhishek Roy**, who earned his PhD under the guidance of Prof. James E. McGrath in the macromolecular science and engineering program. Roy is the lead product research and development manager and technical platform leader for the



reverse osmosis (RO) membrane chemistry platform of Dow Energy and Water Solutions. He has authored 30 peer reviewed journal articles and holds 10 issued patents, with many pending on his RO work. Roy was recognized with numerous awards including Dow's prestigious Sustainability Innovator Award and Virginia Tech's outstanding recent alumnus award from the College of Science

Prof. Feihe Huang (Zhejiang University) received the 2016 Polymer Chemistry Lectureship Award from the Polymer Chemistry Editorial Board. This award, now in its second year, honors an early-stage career researcher who has made significant contributions to the polymer chemistry field. Prof. Huang obtained his PhD in Chemistry in 2005 under the guidance of Prof. Harry W. Gibson.



Recent VT undergrad, **Lucy Tamberrino**, who conducted independent research with Prof. Felicia Etzkorn, is half way through her Peace Corps commitment in Tanzania. As evident in her recent letter to Prof. Etzkorn, she is truly embodying the motto of Virginia Tech: "Ut Prosim —That I May Serve."

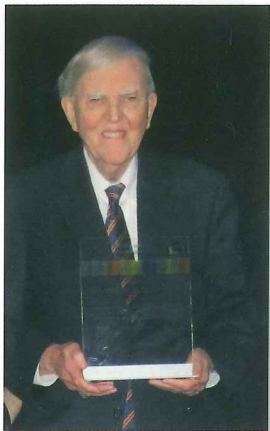


"For the past year I have been teaching chemistry to secondary students while focusing on gender empowerment and HIV/AIDS education and prevention through secondary projects. I have even taught some

of my students about solvent extraction! Secondly, I have been breaking down gender norms to encourage female students to study math and science, creating a life-skills club, hosting an International Women's Day event at my school, enrolling six students in a regional science conference, and assisting in the planning of a world HIV/AIDS Day event for the five surrounding villages. Although my work here has many challenges, I am overall feeling very positive about my time in Tanzania."



The Vinyl Institute honored **Prof. William H. Starnes** (Class of '55) with the Roy T. Gottesman Leadership Award. Dr. Starnes is the first academic to receive this award, which was established in honor of the Vinyl Institute's founding director and recognizes outstanding service to the vinyl industry during a person's career. Currently Gottwald Professor of Chemistry, Emeritus, at the College of William and Mary, Dr. Starnes is considered to be the world's leading academic expert in the chemistry of vinyl plastics. Of the many contributions Dr. Starnes has made to the vinyl industry, he is known for inventing the ester thiol stabilization technology for PVC, which eliminates the need for stabilizers containing metals; the technology has been licensed for commercialization in the US and overseas. He also invented the reductive dechlorination method for determining the molecular microstructures of PVC and other chlorinated polymers – this method is still the standard approach throughout the world. Dr. Starnes is also a longtime member of the Department of Chemistry Advisory Council (DCAC).



Synthonics, Inc. was recently awarded the TechNite 2016 Innovator Award by the Roanoke-Blacksburg Technology Council.

Dr. Thomas Piccariello (pictured) is the company's President and Director. Dr. Piccariello earned his B.S. in biology, and PhD in chemistry at Virginia Tech (working with Prof. David Kingston). The Department is also proud to add that Tom is also the Chair of DCAC.



Dr. Leah Heist, an undergraduate BS major (2011) who conducted research in the Madsen and Santos groups, graduated with a PhD in Chemistry from UNC Chapel Hill in December 2015. Since then, Dr. Heist has been working as a

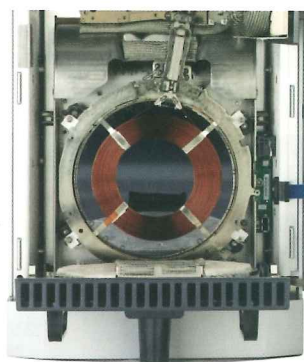


researcher and engineer at the 3D printing startup company "Carbon" in Silicon Valley, which was co-founded by Prof.

Joe DeSimone (VT PhD), who was featured in the Spring 2016 issue. Also working at Carbon as a research scientist is a former Tim Long PhD., **Dr. Nancy Zhang** (2013) who joined them in September.



Dr. Min Mao (2007 PhD with Prof. S.R. Turner) was awarded the Proctor & Gamble John G. Smale Innovation Award, which is given to R&D stand-outs who work embodies the ideal of breakthrough innovative thinking and for continuing to push back the frontiers of polymer science. Their at Proctor & Gamble. Two other VT alums have also been honored with this award; John Layman (PhD with Prof. T. Long) and Matt McKee, also a Long doctoral student. Dr. Layman was also recently promoted to Section Head at P&G.



Agilent's new planar chromatography column lies flat against a mirror-like heating plate.

Dr. Joseph L. Hedrick (1992 PhD with Prof. Larry Taylor) was recently featured the 9/5/16 issue of *Chemical & Engineering News* in an article entitled "Can Agilent reset the GC arms race?" Hedrick, a master gas chromatographer, manages GC commercialization and workflow at the scientific instrument maker Agilent Technologies, where he is part of a team that is launching a new gas chromatograph called the Intuvo 9000. Like most companies launching a new

product, Agilent contends that the Intuvo 9000 is transformative. But what makes this launch different from other launches, Hedrick and his colleagues say, is that the new instrument's improvements are not in technical firepower but rather in ease of use and speed.

DEPARTMENT OF CHEMISTRY ENHANCEMENT FUND

**YOUR SUPPORT HELPS
INVENT THE FUTURE!**

The Department of Chemistry has a rich history and a strong international reputation. We prepare the next generation of science leaders for careers in industry, government, and academics. Our curricula provide the educational foundation for all Virginia Tech science and engineering students. For two consecutive years, our hands-on, minds-on learning environment has been recognized with the University Exemplary Department Award.

Your annual support is critical to our success. Contributions from our alumni and friends help support deserving students, engage in community outreach, provide state-of-the-art technology, and expand research activities.

This year, we invite you to support the **Department of Chemistry Enhancement Fund**. The fund provides immediate, discretionary support for a range of activities including:

- scholarship and research
- faculty recruitment events
- faculty, staff, and student activities and awards
- seminars and guest lectures, and
- outreach efforts

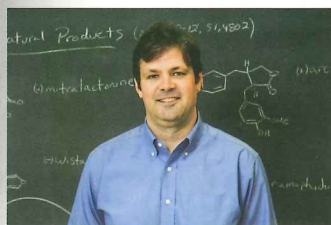
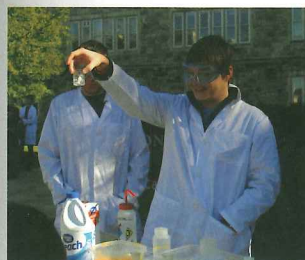
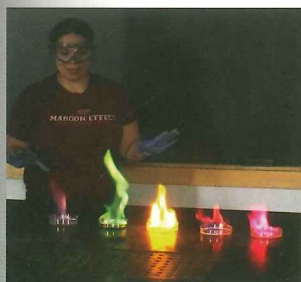
Every gift counts – no matter the size. Our goal this coming year is to **increase overall participation**. A gift to the Department of Chemistry Enhancement Fund is the clearest signal our alumni and friends can give to show their support of the great work of our faculty and increase the quality of the overall experience for our students. **When all of us give, our collective contribution makes a significant difference.**

When you receive your College of Science Annual Fund brochure or phone call, please direct your support to the **Department of Chemistry Enhancement Fund**. To make your gift today, please visit our secure, online giving page at givingto.vt.edu or send your check made payable to the Virginia Tech Foundation Inc. to the address below. Please note Department of Chemistry Enhancement Fund (881327) in the memo section.

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For more information or to learn more about other ways to give, please contact Jenny Orzolek, Director of Development for the College of Science, at 540-231-5643 or jorzolek@vt.edu.

We thank you for your support!



Highlands in Chemistry seminar speaker, Prof. William Dichtel (a 2015 MacArthur Fellow), who is one of the dozen guest lecturers who visited the Department this fall.

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Chemistry's 2016 Summer Picnic

