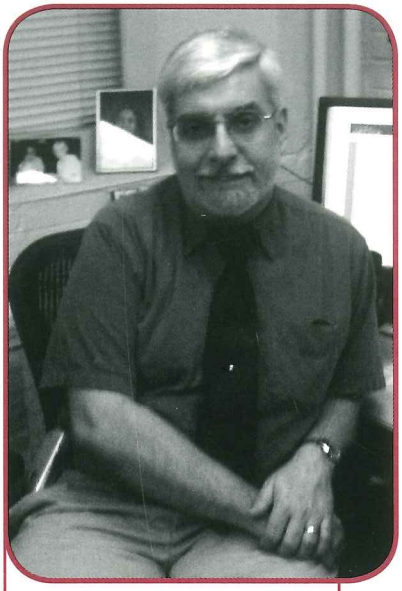
# E L E M E N T S

*The Alumni Magazine of the Department of Chemistry at Virginia Tech - Spring 2006*



## Chemistry's Commitment to the Teaching Mission

In the last issue of *Elements*, I wrote about research expenditures, research rankings and what all of that means to the department. In this column, I would like to take some time to discuss the tremendous job that the chemistry faculty and staff do to make sure our students are receiving the best education we can provide.

Let's start out looking at some numbers. One number that is used a lot is "student credit hours"(SCH). If a student is taking a 1 credit chemistry course in a given semester, that would be considered 1 student credit hour. If a student is taking a 3 credit chemistry course in a given semester that

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CH EM
IST RY

*Tel: 540-231-4510*
*Fax: 540-231-3255*
*jmerola@vt.edu*
*www.chem.vt.edu*

## Who Is It Behind Those Foster Grants?

On November 29, 2005, a visitor came to the Chemistry Department and made heads turn. "Is that really him?" "Nah, it can't be – why would he be in Davidson Hall?" But, yes indeed it was him! Who? Well, if you have already glanced at the picture (which you almost certainly did first, anyway) you know that the visitor was "The King – Richard Petty." Now, I am sure there aren't very many (if any) alums that don't know who Richard Petty is, but just in case, he is the "King" of 32 years on the NASCAR Winston Cup Circuit with 200 career wins. Over his career, he won the "Most Popular Driver Award" nine times.

So, why *would* he be in Davidson Hall? John Morris and Joe Merola are working on a project that deals with a potentially revolutionary gas additive that improves mileage. This research is being sponsored by Demeter Corporation. We can't say much about that project right now, but Richard Petty heard about the research and wanted to learn more about it. Petty was given a tour of the "Smart Road" as well as Davidson Hall, Hahn Hall and Chem-Phys. He was particularly taken by John Morris' laboratory which is a treasure house of stainless steel vacuum equipment with all kinds of interesting things hanging off them. He was very impressed with Virginia Tech and would like to come back when the work is further along.

*Members of Professor Morris' Research Group*

# Early Days w/ Dr. McNair

Harold McNair

In 1968, I was working for Varian in Palo Alto, CA, but living in Berkeley (in those days this was about a 45 minute commute if the traffic was right). I had been in contact with Alan Clifford, Head of Chemistry, about coming to VPI for about one year. Alan had been on my Ph.D. committee at Purdue. He wanted me (among other things), to bring some ACS Short Courses to Virginia Tech. I formally interviewed at VPI in early May 1968, and accepted the following week.

VPI didn't provide any moving expenses from California, so we sold about half of our belongings, paid a student to drive our car to Chicago, and our family of five (Erik 6, Josh 4, and Saskia not quite a year) came by plane. I had bought a house (933 McBryde), but of course it was not ready! We spent 6 weeks in 2 rooms at the Terrace View Motel - boy were we happy to get into our new home!

I began teaching Quantitative Analysis, and we had four labs even in those days. I also taught the Quant lecture and a graduate course, Advanced Analytical, to a small class (~12 students). There were about 50 graduate students in chemistry. Varian had donated a good GC system, and I soon assembled components for a gas cylinder driven HPLC system so we could start research in both GC and HPLC. Alan had allocated only $500 start-up funds, so the initial lab set-up went very slowly! We purchased syringes, gas cylinders and lab supplies and wrote proposals.

Harold Bell

Our first summer (1969), NASA wanted to put a man on the moon, so Tom Ward and myself worked at NASA, Langley that summer, and we did put a man on the moon.

I worked there on a Helium Ionization Detector for Ultra Trace Analyses of gases in space capsules. This was a detector which I helped develop on my Fulbright in Holland in 1960. Varian had commercialized it. The GC unit was so sensitive that we kept it in a large plastic bag, purged with helium, and kept standards, syringes, supplies inside the bag (somewhat like a glove box). We could measure low ppb of many gases, and one of them, vinyl-chloride, was involved in the death of one orbiting monkey shortly before the moon landing. Once we pin-pointed the problem, it was easy to remove it from the cabin atmosphere with an adsorbent. Regenerating adsorbents was easy as the space capsule had an outlet to "space vacuum". We also spent a lot of time planning for a manned mission to Mars.

Jimmy Viers

Jim Wightman

The three big thrusts of the chemistry department at that time were: 1) a new chemistry building; 2) more graduate students; and 3) the revision, upgrading of the graduate program to include new core courses in all areas, and a new cumulative exam system.

Early on (1969 ?) Ray Dessy and myself wanted to buy a laboratory computer. The request was denied because, "we already have one in Burruss Hall!". Two graduate students, Marcus Cooke (H. McNair) and Tom Ryne (J. Dillard), did do research using the Burruss computer, but only late at night as our research priority was very low compared to University payroll and grades. Ray and I finally made a small movie (no videos yet), "Small Computers in the Chemistry Lab," in exchange for a PDP-12 computer.

As I had spent all my $500 on syringes and Swagelock fittings, I didn't have any travel funds, so I initiated an ACS short course, "Basic GC," to be a four day lab course at VPI, and a two day lecture offering at national ACS meetings and the Pittsburgh Conference. They paid for all travel, and generated some research funding. More important, instrument makers were eager to bring new systems on campus, and sometimes leave them. This led to a long and profitable relationship between myself and the American Chemical Society. That special account for Short Courses generated over $1.6 million in the next 35 years.

I remember the atmosphere in chemistry as being both friendly and supportive. Everyone wanted to build up the program in chemistry. I had initially intended to come for only a few years, but I soon realized what a great department chemistry was, and what a great place Blacksburg was for raising a family.

# Faculty In The News

## LONG SELECTED VICE-CHAIR

Professor Tim Long was selected to Vice-Chair the Polymers East Division at the Gordon Research Conference, June 19-24, 2007 and to Chair it in 2009. Professor Long has been invited to serve on the external advisory board of "Macromolecules" starting 2006. He was also selected to co-organize the 2006 Division of Polymer Chemistry Biennial Meeting. "Polymer Innovation at Emerging Boundaries of Science and Engineering", May 21-24, 2006.

## TURNER NAMED SPEAKER OF THE YEAR

Professor Richard Turner was named The Northeast Tennessee Section ACS Speaker of the Year for research in specialty polyesters. Professor Turner was also named Editor of the Americas for Chemistry and Synthesis of POLYMER.

## PROGRAM RENEWED - RJRT

RJ Reynolds Tobacco Company has renewed a program with Virginia Tech's Department of Chemistry. Known as the RJRT – Harold McNair Fellowships in Analytical Chemistry, this program was established to recruit and train new researchers that demonstrate the pursuit of a productive and vigorous career in analytical chemistry.

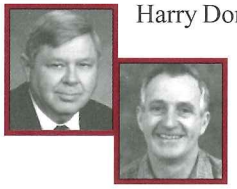
Renewing the program in 2002 was Michael Borgerding, senior principal scientists for RJ Reynolds Virginia Tech alumnus. William Coleman III, senior principal scientist for RJ Reynolds and graduate of Virginia Tech's chemistry program, is also involved in the program.

The most recent $300,000 fellowships funded three research teams; two were led by Larry Taylor, who studied nicotine fate in a burning cigarette and isolation of sucrose esters from Turkish tobacco. The third was led by Brian Hanson, whose postdoctoral fellow studied NMR techniques. The results were a total of six papers, three presentations at a recent Tobacco Science Research Conference, and one patent application.

## MCNAIR TO GIVE PLENARY LECTURE

Professor Emeritus-Harold McNair-was invited to give a plenary lecture at a Gordon Research Conference (September 2005) in Switzerland. The conference title was "Detecting Illicit Substances: Explosives and Drugs." Harold's lecture was on novel methods for detecting trace vapors of explosives in bulk cargo, primarily air freight. To date the project has been funded for over $1.2 million. Dr. Bob Boggess (professor emeritus – Radford University) is part of the research team.

## DORN AND GIBSON NANOPARTICLE



Harry Dorn and Harry Gibson, both chemistry professors at Virginia Tech, along with other colleagues, have created a metal-filled nanoparticle called a functional metallofullerene (fMF) that will serve as a diagnostic and therapeutic agent that may boost the sensitivity of MRI techniques and improve the diagnosis and treatment of brain tumors. Panos Fatouros, a professor in the Department of Radiology at Virginia Commonwealth University, has been awarded a five-year, $3.7 million grant from the National Institutes of Health's National Cancer Institute to lead a team of scientists from VCU and Virginia Tech. It is envisioned that this research will generate a multifunctional platform that will identify brain tumor cells and selectively target them for radiation therapy.

Fullerenes are hollow carbon cage-like molecules that were discovered in the 1970s. In 1999, Dorn and his colleagues encapsulated in the hollow interior of these nanoparticles rare earth metals that can easily be recognized by MRI techniques. Preliminary experiments conducted in the VCU labs of Fatouros and William Broaddus, a neurosurgeon, showed that the nanoparticles highlighted the tumors more effectively (at least 40 times) than existing imaging agents and

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# Musical Motivation in a Chemistry Setting

*Kay & Accompanist*

It started with a simple request from my husband, Neal, "Would you give a piano recital for my retirement celebration?" and it became an evening celebration of soft joy and wonder - an evening of music, fine food, with friends, family, colleagues, students and associates which was held during the winter break.

About a year ago, I read an interesting article which discussed the special relationship that a number of chemists have with music - while not exactly common, it is also not so unusual. It was fascinating following the recital to learn that in addition to the faculty whom I knew have a relationship with music, another faculty member had seriously studied classical piano when young and one had actually worn out a tape which included the closing piece, the Chopin g-minor Ballade.

I studied piano as a child from 8 until 16 years old at which time I decided that science was my greater love and the next year went to UC Berkeley and majored in Chemistry. But, there was always a passionate relationship with music. The relocation to Blacksburg from the San Francisco Bay Area, opened up the possibility of seriously studying piano again. It has been a long journey from the decision to pursue that path to the performance this winter. In order to even begin piano lessons I had to audition. Ms. Teresa Ehrlich, a fine pianist, posed it as a meeting to see if we would both be comfortable with one another - as I said, AN AUDITION!!! Frankly I was terrified, but I had no choice. I now know this woman has great courage, because she accepted me as a student and although, she once fell on the piano in despair over my pedaling saying, "It's just awful!" she still patiently teaches me.

It is difficult to describe the journey to the recital simply, because it has not been simple. It runs up and down mountains, it diverges and reemerges, it changes directions and focus, it is elating and frustrating, uplifting and draining - but always, always there is an energy which keeps me moving, driving me to play. Sometimes I hear music that catches my attention and compulsively want to "touch" the keys - to feel the notes. But, why perform? Why not just study and play at home?

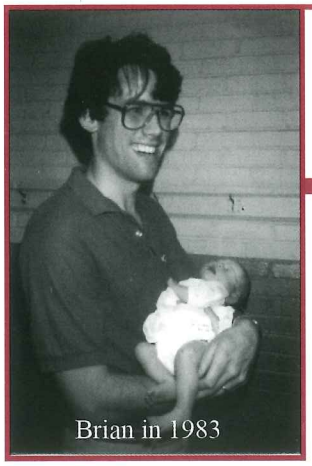
To truly play well, performance is a component of that quest, that requires one to work to hone and perfect the music. No amount of playing truly ever leads to this. And in a performance things happen that never happen at any other time. When a complete commitment is made to the music, to each note, to each phrase, to the essence and meaning of those black notes on white paper, the audience and the musician become a unique moment in time that can never be repeated. That is a true performance and it caresses our humanness - it contains our emotions, our understandings and touches us all.

I have heard amazing comments from people after I have played, things they heard or sensed that brought something new to me, sometimes in startling ways. One woman shared with me the worst experience of her life that had been brought back to her by the music I played. This is the power of music.

And so I play. I play alone when the power is out and pretend it is the time of Mozart with candles lit which form a glow. I play for Neal, I play in small venues, I play for fun, but I play my best when the audience radiates an energy that transcends words. I was accepted and played at the first International Van Cliburn Competition for Outstanding Amateurs in Fort Worth, TX. There were 92 participants from all over the world, and when I found out what I was facing, I was initially stunned and then finally decided - "Do your best." And I did! It was my finest performance ever. I played on a Steinway brought from New York with which one could coax amazing nuances of tone and color - the small audience was energized! This showed me that no matter how old, one can learn and grow. And I did again this January. That performance as my husband said, "raised the bar" for me. This is an astonishing discovery - that at 68 years old, one can still make fingers move faster, pedaling can get better, tone control can improve and the understanding of those black notes can be refined. The great gift left to us by composers can continuously be explored and shared. Elated from the glowing evening for my husband Neal, I have dreams and goals that will lead me through many, many hours of putting fingers to the keys.

Kay Castagnoli

# Faculty Spotlight


Brian in 1983

## Brian Hanson at Virginia Tech

The job market for chemists in the late 1970s was beginning to recover following the 1973 oil embargo induced recession. I was lucky to have several interview trips and ultimately three job offers. My decision to come to Blacksburg was based mainly on what I perceived to be a friendly work environment. I remember well how John Dillard greeted me at the airport, "Hi, I'm John Dillard. Glad to know you." My first impression has proven correct. I am now in my 27th year at Virginia Tech, which makes me one of the old guard.

I have had the good fortune to have had a small but very productive research group over the years. It started in the summer of 1980 when Ed Motell, a chemistry professor from UC San Francisco, was visiting Harry Dorn. Ed taught me solid state NMR and I taught him a little metal carbonyl chemistry. Together we published a paper on the solid state dynamics of iron carbonyl, my first paper from Va Tech. That work attracted some interest in the metal carbonyl community and got me off to a great start. Ed was a pilot and he had flown a little stunt plane from San Francisco to Blacksburg. I remember that he took me for a flight one afternoon. It was a single engine plane and I asked him about its glide plane in the event the engine malfunctioned. "A 747 has a better glide plane," he said, "This plane is all engine and will drop like a rock." My life insurance was paid up, so I went. It only took one barrel roll to turn me green. For the rest of the flight Ed kept the plane straight and level. I considered it a success that I kept my lunch down and an even greater success that we landed safely. I am not afraid of flying but I declined future flights with Ed.

My first six years at Virginia Tech were busy, and productive. My family grew; Nick was born in 1980, Andrew in 1983, and Erin in 1986. The NSF funded a project on the solid state dynamics of metal carbonyls, and a second project with Mark Davis in Chemical Engineering on the entrapment of metal complexes in zeolites as catalysts. In the spring of 1986 the University awarded me tenure.

I managed to get a Humboldt Fellowship for a sabbatical year in Germany for the academic year 1987-88. I spent the first nine months at the University of Freiburg and I spent the summer at the University of Munich. My greatest accomplishment that year was to become reasonably fluent in German. I was pretty proud of my new found language skill but I was humbled by the speed with which Nick and Andrew learned the language. Andrew was five when the catalysis group at Munich hiked to Prof. Knozinger's Alpine Hut in Austria for the weekend. We had been in Germany for one year at the time. Nick, Andrew, and I drove to the trailhead with a young American couple and we spoke English on the drive. Andrew and I were the last to finish the hike to the Hut. I grabbed a beer and sat at the table with the group for lunch. Andrew noticed the beer and realized that the language had switched from English to German then asked the American man "Warum hast du kein beer mitgebraucht."

My second six years at Virginia Tech were more productive in the laboratory than the first six years and just productive enough at home. Gregory was born in 1992. I was promoted to full professor in the spring of 1991. For most of the 1990s my group worked on the synthesis of surface active phosphines. This work was funded by NSF and by Hoechst Celanese. The supported aqueous phase work and the water soluble phosphine work earned me many publications and eight patents. The patents, however, have only earned me several plaques, provided by Va Tech, and several free lunches, courtesy of Virginia Tech Intellectual Properties, Inc.

The weight of two careers, four children (three teenagers) proved to be too much by the end of the 1990s. My first wife and I dissolved our marriage in 2001.

How does a half time single dad find a date? The dating scene in Blacksburg is limited for a middle-aged man. With more than a little trepidation I enrolled at Match.com in the spring of 2002. In my first week at Match.com I came across an interesting profile of a professor in Winston Salem, North Carolina. She had a book and Latin roots, or, so said the profile. After one double blind email exchange through the Match.com website I learned that her name was Olga Valbuena an English professor at Wake and her book was "Subjects to the King's Divorce". She may have thought I was a stalker when I emailed her at work but I told her exactly who I was. After several

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# Department Chair *(Continued from Page 1)*

would be 2 student credit hours. The other term is "weighted student credit hours" (WSCH). I don't think I can do better than the definition listed on VTs Institutional Research & Assessment website:

> *"A measure of instructional output that differentially weights student credit hours (SCH) in favor of higher levels of students taught. Weights are 1.00 for lower division undergraduates (freshmen, sophomores, non-degree undergraduates, occupational technical students), 1.67 for upper division undergraduates (juniors, seniors, 5th year students), 2.50 for first graduate students (graduate students with 30 or fewer SCH or first professional students in the College of Veterinary Medicine), 3.13 for advanced graduate students (doctoral students with more than 30 SCH)."*

The important message is that a department gets more credit for courses the more advanced in material they become.

The numbers for Chemistry are staggering: In academic year 2004-2005, the chemistry department taught a total of 31, 673 SCH and 42,197 WSCH. The total number of SCH places us second in the College of Science behind Mathematics. The University has also been looking at "WSCH per faculty member". Chemistry comes in at 1,273 per faculty member which gives us a ranking in the university of the 19th highest teaching load. To put this in context, let's compare the chemistry teaching load vs a number of departments in the College of Engineering, listed anonymously in random order: 289, 394, 511, 506, 250, 388, 494, 206… The comparison is striking: the Department of Chemistry has a 3-4 times higher teaching load than any department in the COE. Looking back to the article in the last issue of *Elements*, we are higher than all but 2 of those departments in total research expenditures. The conclusion? Chemistry carries out an exceptional amount of research while having a teaching load that is staggering.

But let's not focus on quantity alone! Chemistry has a great deal to be proud of in the areas of teaching excellence. Over the last several years, Chemistry has the distinction of having more of its faculty members inducted into the Academy of Teaching Excellence than any other department. Those faculty members are: Patricia Amateis, Jim Glanville, Harold McNair, Joe Merola, Gary Long, Larry Taylor, Jimmy Viers, Tom Ward and Jim Wightman. Over the last several years, Patricia Amateis, Jeannine Eddleton and Preston Durrill have been in the top ten of vote-getters in the "Most Appreciated Teacher" poll held by the Student Alumni Associates.

While the previous paragraph highlights a few individuals, the department shows excellence across the board. While student evaluations are not the complete story, students do tend to be the harshest critics of our teaching. For Fall, 2005, all evaluations for chemistry faculty (2,814 student responders) showed some very nice results reflective of the department's excellent teaching. On a 4 point scale, when rating their professor on "Knowledge of Subject", students gave the faculty in the department an average rating of 3.8. In the area of "Overall Rating" students gave faculty in the department an average rating of 3.5. In an area that I personally think is very important, "Concern and Respect" students gave our faculty an average rating of 3.6. Again, put these numbers in context of how productive the department is in research accomplishments.

I want to thank all of the alumni who support their department in quite a variety of ways. I want to give a special thanks to those who support scholarships and awards because that gives us the ability to reward our faculty, staff and students.

I would have to conclude that, clearly, the department is doing something right.

## Did You Know?

Department of Chemistry

- 30 Faculty members
- 110 Graduate students
- 30 Postdoctoral Fellows
- 150 Undergraduate majors
- Six NSF CAREER Awardees
- Two Fulbright Research Scholars
- Currently ranked 29th in the nation by NSF
- One National Academy of Engineering member
- Three Virginia Scientist of the Year awardees
- $5+ Million in annual external grant support

# Alumni Spotlight

## The Thermodynamics of Family Life

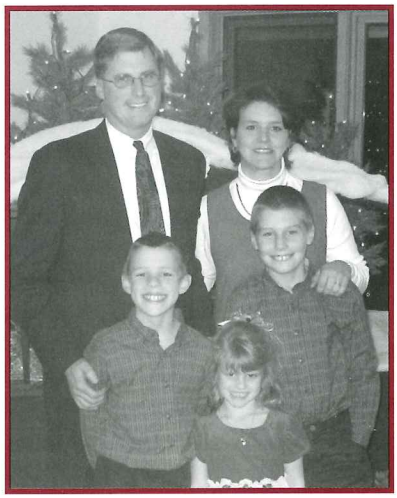
**Cynthia H. Kirschner**
*(Ph.D., 1993, Analytical Chemistry)*

Another typical day in the Kirschner household – get the kids ready for school, get ourselves to work, and then rewind the process later in the day. Throw in a Cub Scout meeting, basketball practice, dinner, and some homework help for good measure. By the time my husband Rich (MS, Biology '91) and I put our kids to bed, there is usually little more we are able to do than do the same to ourselves! Recently we were having just one such day, and as we tried to tidy up at least some of the chaos we call home before turning in, the TV happened to show clips from an old episode of Saturday Night Live. Feeling nostalgic, I turned to my husband and said, "Hey, look! Remember that? That episode aired back when we were at Tech. We both remembered those days well, and fondly. "You know," I mused to Rich as we toiled, "we thought life was REALLY HARD back then, didn't we?" Rich nodded "yes" in reply.

Life is one big equation that must be constantly balanced! When Rich and I left Virginia Tech and began working for DuPont in '93, our ratios were simple: input two new employees, output careers. Add an old house to scavenge any excess time or money we might have, and that pretty well sums up our first two years in West Virginia! With the arrival of son Evan in '95, however, the equation of life was altered dramatically, and the addition of son Ryan in '96 nearly left us in a state of complete entropy! Change had occurred, pressure was rising, and change was therefore necessary to regain balance. In finding that stability, two Laws came to mind: Conservation of Energy (I only had so much of it to spread around!) and Conservation of Matter (figure out what "matters" most and keep it constant!) I therefore shifted my work status to part-time so as to accommodate the demands of our young family. This was a good plan, especially with the addition of daughter Caroline in 2000. Our lives now included these three precious little "reactants", and I really wanted to be a daily part of the end product.

Every year since brings a new twist or caveat to maintaining the balance. When our children began entering school, suddenly I found myself in a chain reaction of roles, from parent and homeroom mom to School Board member/ Secretary and Academic Committee chairperson. The same evolution occurred in my church, as I grew from parish member to CCD teacher to Director of Religious Education. Each of these roles consumes a certain amount of time and energy, but the satisfaction they produce helps make the balancing act much easier. I have also coached Odyssey of the Mind teams, served as a Cub Scout leader, and am now in my first year as an assistant leader with the Girl Scouting program. It requires a certain amount of organization and planning skills to fit these roles into an already loaded schedule. I take a lot of ribbing when preparing for family trips, especially to our favorite biennial destination, Walt Disney World. (But doesn't everyone use EXCEL and MINITAB in their vacation planning?) I have been known to spend countless evening hours on the computer, researching places to go, mapping routes, determining daily costs, etc., sometimes years in advance, like a Six Sigma tour guide possessed. Using such tools to plan a family vacation is actually a big part of the "fun" to me, much in the same way that cooking is my cathartic way of doing "casual" chemistry in my kitchen.

The "equation of life" in the Kirschner house is always changing, but we do our best to keep it stable. The biggest, most recent change to this delicate equilibrium occurred this past fall when our youngest child entered kindergarten and I returned to work full-time at DuPont. My current assignment is in R&D division of glass laminates, which is actually a very good fit for me. One of the issues with automotive glass is its weight, especially when used atop the car in roofing systems. Manufacturers are always looking for lighter alternatives to heavy tempered glass, so as to keep the center of gravity of the vehicle as low as possible and maintain optimum balance on the road. Finding balance, eh? Now there's a problem I can relate to!



# Light Activated Molecules to Attack Cancer Cells

Chemotherapy kills cancer cells. It can also damage healthy cells and make sick people sicker. And then the cancer cells become resistant to treatment. For nearly four decades, scientists have sought alternative drugs and drug delivery systems. Professor Karen Brewer and Professor Winkel in the Department of Biology joined the battle in 1992 after joining Virginia Tech's faculty.

"Anyone who has seen patients undergo chemotherapy would feel strongly that we should work to make this process less toxic on healthy cells in the body," says Brewer.

The research team started by looking at ways to overcome some of the inherent drawbacks in the widely used cancer drug Cisplatin.

The first thing the research team did was develop a platinum system that would dissolve in water. Once they did that, her work focused on the other drawback with Cisplatin: that tumors can become resistant to the drug.

The team was eventually able to change the shape and basic properties of the platinum-based molecule, thus making it unrecognizable to the tumor. They created a molecular complex, or supramolecule, that allowed them to change parts.

One of the ways of decreasing the harsh side effects of chemotherapy is to deliver the therapy only to cancerous cells, thus maintaining the integrity of surrounding healthy tissue. Currently, one method that is fairly effective at more precisely targeting cancerous cells uses light-activated therapy. Again, a promising therapeutic technique, but not without a few inherent problems. The main one is that because the light energy is transferred to oxygen, this treatment method is not highly effective in aggressive tumors because they are already depleted of oxygen due to their rapid replication.

But the research team designed supramolecular complexes that can hold and, when signaled by light (photoinitiated), will generate pharmaceutical compounds that can cleave DNA, such as in a tumor cell.

Brewer and a former postdoctoral fellow, Shawn Swavey, co-hold a patent in this new technology, which is licensed to Theralease. The project has received $300,000 in National Science Foundation funding for three years and is capturing the attention of research partners at other institutions across the country.

# Faculty Spotlight - Brian Hanson

*(Continued from Page 5)*

weeks of correspondence she agreed to a date. She married me in 2004. The photo is from our honeymoon in Cancun.

The last two years have been productive again in the lab. My work has shifted to the synthesis of hybrid inorganic/organic materials. Funding from RJ Reynolds Tobacco Co. of Winston Salem has helped start the new project.

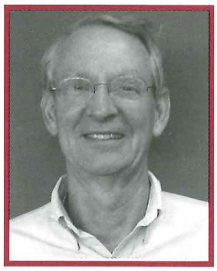
At home we have synthesized a hybrid, modern family. Between us we have six children, two houses, and two careers. Most of the children are on their own, Gregory and Olga's youngest, Elisa, are still in school, and Erin and Olga's oldest, Natalie, are in college.

Compatibility is everything and while there is plenty of baggage there is little that weighs us down.

# Alumni Highlights

**Linda Berry Robbins** (B.S. '82) from GlaxoSmithKline, Bristol, TN, has donated a CAMAG HPTLC instrument worth about $40,000 to the department. She says, "I did my undergraduate research for Dr. Harold Bell (a literature search to enhance stats on Schooley's constants for NMR). I transferred to Tech and after not having a foreign language in high school, was advised to take German. At Va Tech, I discovered I had to study much harder just to pass, so I had to learn how. (I am raising my daughters correctly!! They are very good students.) So I may not have been chemistry material, but I stayed with it (I couldn't convince myself to give it up – I loved it so) and my grades significantly improved during my time at VT."

**Samuel Tucker** (B.S. '67). I love my job as a Research Chemist at NIOSH (National Institute for Occupation Safety and Health) where I started working in 1975. I am beginning my fourth year as an officer in NIOSH Toastmaster. Toastmasters is a professional organization for public speaking. Toastmasters helps one to improve public speaking skills, to think on one's feet and to build leadership ability. Last June, I completed my tenth speech, a speech which qualified me to receive the Competent Toastmaster Achievement Award (or CTM). This speech was an inspirational speech and was entitled "The Drive for Excellence in Chemistry."



**Jim Vander Meer** (Ph.D. '78) Analytical Chemistry Section Manager in Procter & Gamble's Household Care Global Business Unit retired on March 15, 2006. Over the past 28 years, Jim worked in Analytical Chemistry, Technology Development, Product Design, Products Research and Current Business at P&G. He played a critical role in the technology development that led to the introduction of Tide Liquid in the early 1980's. Before coming to Procter & Gamble, Jim was an Associate Professor of Analytical Chemistry at St. Louis University in St. Louis Missouri for five years.

**Dale Messer** (M.S. '91, Ph.D. '94). "I still live in Kansas and work at MRI in Missouri. Work is going well, but I need to start building my own client base, to add to the large government program my group already works on. On a personal note, I am looking for new hobbies, and spending more time fishing, hunting, and shooting some targets. I recently started shooting in a .22 caliber pistol league. So far the experience has been a lesson in humility. The kids are doing very well. Tim is a junior at Kansas State in Manhattan KS with a major in computer science, and seems to be on schedule to finish in 4 years; at least that is the plan. Jessica is a junior in high school and is a straight A student, (which is far better than her father did in any phase of his educational career)."

**Dennis Taylor** (Ph.D. '96) is Lecturer in General and Organic Chemistry at Clemson University, 2005-06.

**Charles Tumosa** (Ph.D. '71). With a doctorate in physical chemistry, he worked on 4,000 homicides during his 18-year tenure running the crime lab for the Philadelphia Police Department before switching gears to set up the analytical laboratory at the Smithsonian Center for Materials Research & Education (SCMRE) in Suitland, Md. The mandate was to help to preserve the collection. "I always joked that it was a place where we watched paint dry," he quips. But "no one has ever done a linear study on how paint ages, and that is one example of what we were doing." Tumosa enjoyed working at the Smithsonian Institution for 12 years. "What we learned we learned the hard way, and that knowledge is not in books, it's not on the Web." On September 16, however, Charles lost his job. Positions were abolished for six of the seven research scientists who worked on independent projects at SCMRE. "We were probably one of the last places to do materials science in the arts, he says.

# Neal Castagnoli Retires

# Scientists Develop Process for Creating Biocompatible Fibers

Tim Long and his research group at Virginia Tech have developed a single-step process for creating nonwoven fibrous mats from a small organic molecule – creating a new nanoscale material with potential applications where biocompatible materials are required, such as scaffolds for tissue growth and drug delivery.

The research was presented in the Jan. 20 issue of *Science*, in the article "Phospholipid Nonwoven Electrospun Membranes," by Matthew G. McKee, a recent Ph.D. graduate in chemical engineering from Virginia Tech's College of Engineering, now at P&G, current chemistry students John M. Layman and Matthew P. Cashion, and Professor Timothy E. Long, all at Virginia Tech's College of Science. Phospholipids, which are the main component of cell membranes in the human body, are exquisite in terms of their ability to self-organize.

Long's group fabricated this natural compound into a submicron fiber – 100 times small than a human hair. It is the first demonstration that electrostatic spinning, or electrospinning, a polymer processing technique, can be used with a small molecule to produce a fiber. Clothing fibers such has polyesters and nylons are composed of large molecules, macromolecules.

The researchers used a commercial product, lecithin, a natural mixture of phospholipids and neutral lipids. The materials will spontaneously organize into cylindrical or worm-like strands to form membranes. This work represents the synergy of electrospinning, the use of self-organizing molecules, and fundamental research to understand the behavior of such molecules. The research is part of the Army Research Office Multidisciplinary University Research Initiative (MURI), which brings together chemistry, mechanical engineering, electrical engineering, chemical engineering, and materials science researchers to accelerate discoveries in nanostructured materials.

*Claudia Brodkin*

# Staff Spotlight

Claudia Brodkin was born in Bogota, Colombia and came to the states when she was 7 years old. She came to live in Bath, PA where her mother was living with her step-father and brother. She is the oldest of five children, one of whom passed away when he was only 23 from complications brought on by a bone marrow transplant. When she came to the states she did not speak a word of English and immediately developed Juvenile Arthritis in her knees. She came to the states in January and did not start school till the following September. When she was in school there was no such class as English as a second language, thus she had to sink or swim. She chose to swim and by the end of the year she was able to speak, write and read English.

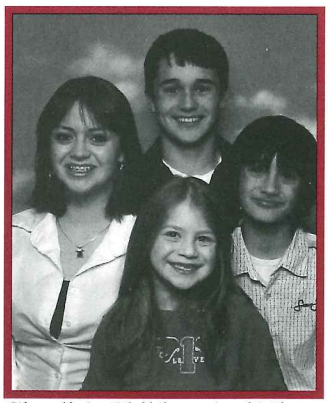
Her mother always pushed her to excel in all she did. Her father, however, told her that girls did not belong in college but at home raising a family and keeping a house. Her father refused to help pay for school and she was left to her own devices. She decided to attend a community college and attain a degree in Medical Lab Technology. Her dream to attain a Bachelor's degree had to be put on hold due to monetary restraints. She went to work at a doctor's office and a hospital upon completion of her degree.

In 1987, she met Chad Brodkin, who would become her husband and father of her three children. He pushed her to go back to school after the birth of their first child Clarissa as he knew it was a dream of hers. She, however, became pregnant with their second child Brandon and school was once again put on a back burner. They moved from West Hazleton, PA to East Stroudsburg, PA and had a third child Devon Brodkin. During this time Claudia started working in the hotel and restaurant industry working breakfast and lunch shift while Chad worked nights. In 1991, they moved to White Haven, PA where she worked in a hotel till it closed its doors December 23, 1997 and if that wasn't bad enough her father passed away the following day. She had been flirting with the idea of going back to school at this point and took this as a sign to do it, she then went back to finish her BS and added education classes because she thought being a teacher would best suit her and her three very busy kids. She graduated in May of 2000.

She had many offers to become a high school Chemistry teacher but her husband could not find a job that would allow him to work days so they could have a better family life. Chad got a job working at Virginia Tech as executive chef of what was then Dietrick Dining center. They fell in love with Blacksburg and decided this was the place to move to. Chad started July 10, 2000 and Claudia and the children spent each and every weekend here looking for a house to rent. They bought a house in 2004 and Chad's parents went to live with them as their health was rapidly deteriorating. When Claudia moved to Blacksburg, she had a hard time finding a chemistry job and started working at Donaldson Brown as their banquet manger. It was there that her life took a turn for the better the night she met Larry Taylor and she started talking to him about the Mobile Chemistry Laboratory (MCL). She was offered a part-time job on the MCL and eventually when her current position opened up she applied and was hired. She loves working with all the students and many know her by her first name and can be found chatting with her at different times.

Claudia's children are very involved with extra curricular activities and keep her very busy thus her license plate CPB TAXI. Brandon has played football and soccer during the fall since he was 7 years old. He will be going to Europe for the Gothia Cup in July with his team. Clarissa has played soccer since she was five and will be trying out for the Virginia Tech Varsity girl's soccer team in the spring. Devon has also been involved with sports since the age of five. He played football in the fall as well as travel soccer for the New River Rapids U-12.

Claudia is currently working on her Master's degree in Educational psychology and looks to graduate in Dec. of 2007. She is advisor for the Chemistry club and Mentor for AX□ (chemistry fraternity). Her husband, Chad, is now Senior Executive chef at Tech with his main responsibilities being Personal Touch catering and food service for club dining and suites at Lane stadium.



Claudia's Children And Niece

# New Faculty in Chemistry - Sungsool Wi

Sungsool Wi is a new assistant professor in the Virginia Tech Chemistry department. He joined our department after spending nearly four years of his postdoctoral training at the University of California, Berkeley and Iowa State University after his Ph.D. He would define himself as a physical chemist although his research area also spans both analytical chemistry and structural biology.

Sungsool was born in a province of the southern part of the Korean peninsular as the youngest child among the eleven children of his parents. As the only son of his grandfather, his dad was determined to make a big family as much as possible after surviving the tragic era of wars, such as World War II and the Korean War. His dream was originally to become a historian rather than a scientist, but later, considering his aptitude, he decided to major in Chemistry after realizing that natural science could provide better opportunities for him to achieve more tangible and practical accomplishments than social science. He received bachelor's degree in Chemistry from Dongguk University in Seoul and a master's degree in Chemistry from the Korea Advanced Institute of Science and Technology (KAIST). His academic achievement in KAIST provided him an exemption of military service, which is mandatory to every Korean man. He worked for LG, a major chemical company in Korea, as a research scientist for 7 years before joining the University of Illinois at Chicago (UIC) as a graduate student. At UIC, his luck led him to meet a great man, Dr. Lucio Frydman. Under the supervision of Professor Frydman, Sungsool received a Ph.D. with the dissertation entitled "Higher-Order Effects in Solid-State Nuclear Magnetic Resonance of Quadrupolar Nuclei." After his Ph.D., he began his postdoctoral career in the NMR group of Professor Alexander Pines in the Department of Chemistry at the University of California at Berkeley. Before joining Virginia Tech, he experienced another postdoctoral training in the Department of Chemistry at Iowa State University under the supervision of Dr. Mei Hong.

Sungsool's research expertise is nuclear magnetic resonance (NMR) spectroscopy in the solid state. He focuses on the applications of modern state-of-the-art solid-state NMR techniques to the diverse problems in structural biology and modern materials. Research areas of his current interest are to investigate structures and dynamics of proteins that can be neither solubilized nor crystallized—as is often the case for membrane proteins, beta-amyloids, and prion proteins.

Sungsool has settled down in Blacksburg with his wife, Soojin Lee, and his two children, Leejoo Wi and James Wi. They are all excited about buying their own house in the Blacksburg area this year. When he is not in his office, Sungsool enjoys spending time with his family.

**DORN AND GIBSON NANOPARTICLE** *(Continued from Page 3)*

provided improved brain tissue differentiation and a dark outline of the tumor margin, making surgical removal more precise. Tumor cells that extend beyond the well-defined tumor margins are often impossible to visualize with current imaging techniques.

The Virginia Tech researchers plan to load the fMFs with a metal that can be neutron activated to produce useful radioisotopes and fluorescent materials. "We will make the fMF radioactive so they can be used in treatment and make the fmFs fluoresce so the doctors can track it and watch the tumor shrink," Dorn said. These particles will be further modified by the VCU-Virginia Tech teams to target cancer cells.

# *Students and Chemistry*

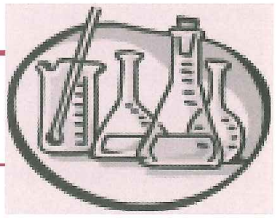
## Students Place First & Second

Virginia Tech undergraduates presented their research during the 3rd annual INSPIRE conference February 10-12 at the University of Southern Mississippi and received 1st and 2nd place awards. Erika Bechtold, a senior, placed first for her oral presentation of her undergraduate research, "Tri-headed, Two-tailed, & Carbamate-linked Amphiphiles". The award consisted of a cash prize and a trip to the International INSPIRE conference in Turkey this summer. Erika has been conducting undergraduate research on anti-microbial amphiphiles under the advisement of Dr. Rich Gandour and Dr. Alan Esker.

Also presenting at the conference were Tim Vadala and Maggie Ashworth, who both conducted research under the guidance of Dr. Judy Riffle. Tim received a second place award, which included a cash prize, for his presentation titled "Polysiloxane Magnetic Fluids for Use in Eye Surgery". The INSPIRE conference focuses on excellence in undergraduate research. Erika, Tim and Maggie were able to interact with students and faculty from other institutions working in the areas of polymers, material science, and biomaterials science.

All three students conducted research last summer in Virginia Tech's SURP program which is administered through the Macromolecules and Interfaces Institute. Funding for the summer research was provided by an REU grant and an IGERT grant from the National Science Foundation.

## Alumni Highlights *(Continued from Page 9)*



Paige Phillips (Ph.D. '98). Currently I am Associate Research Professor in the Department of Chemistry and Biochemistry of the University of Southern Mississippi. I travel to Virginia often to visit family and friends. I have missed everyone from VT.

Congratulations to James Hedrick (B.A. '86. Ph.D. '87) of IBM Almaden Research Center, winner of the 2006 Industrial Polymer Scientist Award presented by the Polymer Division of the American Chemical Society. A symposium in Jim's honor will be arranged at the San Francisco American Chemical Society Meeting this fall.

Kevin Schug (Ph.D. '02) Assistant Professor Department of Chemistry and Biochemistry, University of Texas at Arlington since fall, 2005.

# Students and Chemistry

*(Continued from Page 13)*

## Recitations in General Chemistry

In the Fall of 1994, the Chemistry Department began offering recitations with some General Chemistry classes coordinated by Professor Patricia Amateis. The recitation program has grown to two General Chemistry classes with recitations each Fall semester and five General Chemistry classes with recitations each Spring semester. The recitations have not only benefited students by increasing understanding and raising grades; the undergraduates who are the recitation instructors have also benefited by being given an opportunity to teach that is usually only available to graduate students.

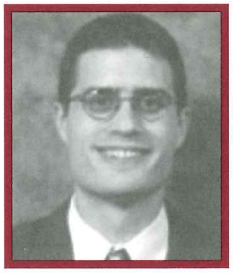
The recitations are small group problem solving sessions facilitated by upperclassmen. Each chemistry lecture class meets in large groups of 200 for two lectures per week that are presented by the professor of the class. This part of the course focuses on giving the student an overview of the course material and relating the course material to the student's major fields of interest by including practical applications. In the remaining hour each week, the large lecture group is subdivided into recitations of 33 students each. The recitations are taught by paid undergraduate student leaders recruited from the better students from previous years' classes.

Funding for the recitations has been provided by the Provost's Office. Since 1994, approximately 75 undergraduates have served as recitation instructors. The undergraduate instructors are responsible for running two 50 minute sessions once a week, writing and administering quizzes, grading weekly homework assignment and quizzes, and offering help on an individual basis during office hours for at least one hour per week

Recitation instructors are junior and seniors in chemistry, biochemistry, chemical engineering and human nutrition, foods and exercise. Most graduating recitation instructors go on to graduate school; many have entered public school science education after discovering from their recitation experience that they enjoyed teaching.

The recitation instructors have been evaluated by their students using the same evaluation form as are used for professor evaluations. Overall evaluation scores for the undergraduate recitation instructors range from 3.3-3.9 (on a scale of 1-4), with the average evaluation score around 3.6.

Recitation instructors are overwhelmingly positive about their recitation experience. "This is a wonderful opportunity!" and "Teaching recitation has increased both my understanding and appreciation for the subject" are common comments from current instructors. Students appreciate having instructors who are close in age and who are still dealing with college themselves. Recitations in General Chemistry have been a win/win situation for everyone!



## Studies Reveal Reaction Pathways for Ozone on Organic Surfaces

John Morris' group is studying the reactions of small molecules found in pollution of surfaces. Morris, associate professor of chemistry in the College of Science, and his students are looking specifically at hydrochloric acid (HCl) and triatomic oxygen (O3, a toxic form of oxygen), pollutants known to play a major role in atmosphere chemistry. They are using functionalized self-assembled monolayers (thin films – one molecule thick) to simulate organic surfaces.

A major finding is that ozone reacts with carbon-carbon double bonds to form crosslinked networks within the thin film. Carbon-carbon double bonds are the very strong forces that link carbon atoms together to help form long-chain molecules – major components of many polymeric materials found in everyday life. "The formation of crosslinked networks is a new discovery – that provides a fundamental understanding of how, on the molecular level, organic surfaces degrade with prolonged exposure to ozone, a major atmospheric pollutant," Morris said. "Understanding the reaction mechanism may someday lead to more robust films for organic coatings, or polymeric coatings, such as paints."

# Donors

Appreciation is extended to all alumni, friends, faculty and organizations that have contributed to the Department of Chemistry at Virginia Tech over the years. Your gifts make a difference and can be designated for general department needs or specific programs and scholarships. The following names are donors for the period July 1, 2005 to December 31, 2005.

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## VIRGINIA TECH DEPARTMENT OF CHEMISTRY'S MISSION

The Virginia Tech Department of Chemistry has a long history, a solid reputation and a bright future. Our courses provide the chemical foundation for all Virginia Tech science and engineering students and broaden their understanding about the structure and properties of matter. Our undergraduate and graduate degree programs prepare society's future chemists and scientists. Our faculty's research and scholarships generate and disseminate chemistry knowledge to the Commonwealth, the nation and the world. And our outreach programs offer opportunities to share this knowledge with others, including practicing professionals, as well as primary and secondary school children. To achieve our mission, the Virginia Tech Department of Chemistry will continue to pursue multi-disciplinary research within and beyond the University, to find innovative ways to instruct students, to forge partnerships with industry and government and to establish a reputation as one of the world's highest ranking chemistry departments.

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