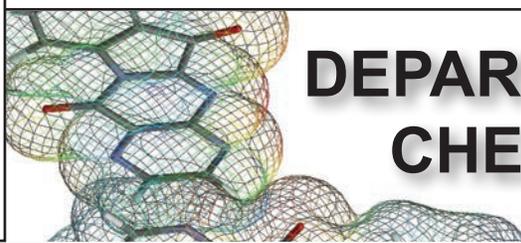
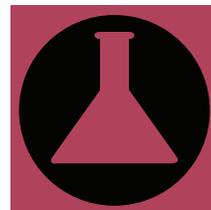




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## DEPARTMENT OF CHEMISTRY



### Welcome to New Faculty: Drs. Smeltz and Takenaka

In addition to our new Department Head, we recently welcomed several new faces to our department. Drs. Norito Takenaka and Jessica Smeltz joined us in 2014.



Dr. Takenaka, who came to us from the University of Miami (Coral Gables, FL), is an organic chemist with an interest in Lewis/Brønsted acid catalysis and natural product synthesis. Dr. Smeltz is an inorganic chemist, having received

her Ph.D. from North Carolina State University (Raleigh, NC). Joining the department as an instructor, she is now teaching a significant portion of our general chemistry courses, and will assume the role of General Chemistry Coordinator, currently held by Dr. Kurt Winkelmann. Our department continues to expand through ongoing faculty searches in physical, analytical/inorganic, and organic chemistry. In the meantime, we are fortunate to have Dr. Mahmoud Saleh, a Ph.D. graduate of Dr. Rudi Wehmschulte's lab, assisting our department as a Visiting Assistant Professor.



While we enjoy meeting new faculty, we are also sad to see friends and colleagues leave. In addition to Professor Babich's retirement, two of our faculty have relocated. Dr. Mark Novak is now at South Dakota School of Mines and Technology, and Dr. Virender Sharma moved to the Texas A&M School of Public Health. We wish them all the best of luck in their new endeavors.

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### End of an Era, and the Beginning of a New One

The Chemistry Department saw the end of an era in the spring of 2014. Dr. Michael Babich retired from service to Florida Tech as the only department head we had ever known. Mike has much to be proud of. He joined the university in 1978. In that year he taught classes in general chemistry, inorganic chemistry (his specialty), instrumental analysis, and physical chemistry. At the time there was no separate department for chemistry. Later, Mike was named the Chair of the Chemistry Program in 1984, and then the first Department Head when the Chemistry Department was formally established in 1988. At the time, there were only six chemistry faculty (which he increased to 16), and no Ph.D. program (which was added in 1990). Furthermore, Mike helped design the F.W. Olin Physical Sciences Complex (opened in 2005), which houses the Chemistry Department (and Physics & Space Sciences). Indeed, current faculty and numerous Florida Tech Chemistry alumni have Mike to thank for the robust program of teaching and research that he built from the ground up. We understand that Mike is currently keeping busy as a volunteer at the Brevard County Zoo. We wish him well, and hope he has an enjoyable, well-earned retirement.



After Dr. Mary Sohn served as Interim Head from 2014-2015, Dr. Michael Freund has now assumed leadership as our new Department Head. Originally from Gainesville, FL (and a graduate of UF), Michael hails from the University of Manitoba where he built an impressive research program, specializing in conjugated polymers in sensing, electronics and energy storage/conversion, and garnering more than \$30M in external research funding and contracts. We are excited to see the continued growth of the department, and we look forward to where Michael will be able to guide us.

### Support Florida Tech on Dec. 1 – Day of Giving

Introduced in the United States in 2012, Giving Tuesday (the Tuesday after Thanksgiving), is a day of philanthropy, celebrating the season of giving. This year's Giving Tuesday falls on Dec. 1 when you will have an opportunity to make a positive impact on your alma mater. By participating in Florida Tech's Day of Giving – an interactive competition between the colleges, athletics, and other campus entities – you will join alumni from around the world to make a difference in the lives of our students and faculty by supporting your school and its future. The participation of alumni and their financial support is a key factor in how organizations, including *U.S. News & World Report*, rank an institution. Your gift is 100% tax deductible, and any amount has an impact. Your donation is a vote for the College of Science and will help us continue to push the boundaries of education and research. Get more information, and sign up, at [DayOfGiving.fit.edu](http://DayOfGiving.fit.edu).

## New Panther Chemists 2013-2015

### Ph.D.

-2013-

Peter J. Cohen (Nesnas): *Novel Applications of Mass Spectrometry.*

LTC Richard L. Comitz (Nesnas): *Design and Synthesis of Caged Neurotransmitters.*

Mohamed Erhayem (Sohn): *Effect of Naturally Occurring Organic Matter (NOOM) Type and Source on NOOM Adsorption onto Titanium Dioxide Nanoparticles Under Varying Environmental Conditions.*

Aaron Funk (Knight): *Attachment of High Charge Density Metal Ions to Biomolecules and Surfaces: Synthesis, Reactivity, and Catalytic Studies of Hypodentate Pentamminecobal(III) Complexes.*

Krishnan Sriraman (Olson): *QSAR of Tryptanthrin Analogs via Tunneling Barrier Height Imaging.*

-2014-

Nathaniel Femi Adegboyega (Baum/Sharma): *Formation and Stability of Silver Nanoparticles from the Interactions of Ag<sup>+</sup> with Natural Or-*

*ganic Matter: Effects of pH, Iron and Light.*

Daniel P. Vorisek (Brown): *Substituent Effects on Carbazolopyridinophane Sensors for Hydrazine.*

Hui Xie (Nesnas): *Preparation of Beta-Cyclodextrin Supramolecular Nanoparticle as a Drug Delivery System: the Design, Preparation, and Properties.*

-2015-

Mahmoud M. Saleh (Wehmschulte): *Synthesis, Structure and Reactivity of Cationic Organoaluminum and -gallium Species.*

Raymond J. Terryn III (Baum): *Density Functional Theory Applications to Potential Energy Barrier Maps via Scanning Tunneling Microscopy Simulations, Ab Initio Docking of Specific DNA Intercalators, and Charge Dependent Ferrate Oxidation Kinetics.*

### M.S.

2013 - Rabab Alahrish, Tamar (Tammy) Bilak Bron, Faieza Bodowara, Long Chen, Beatrice Darko, Amel Garbou, Amal Mogharbel, Roaa Mogharbel, Najat Shamis, Nada Traina.

2014 - Omar Al-Danoon, Mohrah Albalawi, Soror Algub, Adibah Almutairi, Salma Alzaharani, Lijin Deng, Stacey Fox, Efram Goldberg, Mazin Halbos, Asma Rakha, Jennifer Redding, Rui Wang.

2015 - Hussam Alhamza, Justin Damon, Junxiao Gan, Moustafa Hamaad, Shahad Khomeis, Qinyi Li, Khalid Osman, Shiyu Sun, Yishu Wang, Chengju Yang, Keng-Chih Yeh, Eric Ziegler.

### B.S.

2013 - Helen German, Adam Prinkey, Ross Russel (*Magna Cum Laude*), Yichao Yu (*Magna Cum Laude*), Melissa Mitchell (*Summa Cum Laude*), John Toothill, Eric Ziegler (*Cum Laude*).

2014 - Norah Ashoura, Zhouxiang Chen, Maria Huba (*Magna Cum Laude*), Bhavna Karnani, Flaminia Marrucci, Monica Moreno Munoz, Anita Ramnarinesingh, Jeffrey Vreeland.

2015 - Leonard Bernas (*Magna Cum Laude*), Carolina Nascimento (*Magna Cum Laude*).

**We congratulate all our new chemistry alumni on their achievements!**

## ⌘ CHEMISTRY DEPARTMENT NEWS ⌘

The Chemistry Department currently includes 48 undergraduate students, as well as 45 M.S. and Ph.D. graduate students. The department also currently manages over \$3.1M in external contracts and grants.

Dr. **Clayton Baum** and his research group have continued their collaborative research (quantum mechanical simulation of STM topographical and energy barrier maps) with Dr. **Joel Olson** and Dr. Mark Novak (now with South Dakota School of Mines and Technology). This work, supported by NSF, has resulted in several publications in the past two years with more on the way, as well as a provisional patent. Ongoing collaborations with Dr. Virender Sharma (mechanisms of Fe(IV), Fe(V) and Fe(VI) oxidations, now at Texas A&M School of Public Health) and Dr. **Alan Brown** (sensors involving fluorescence and H-bonding) are taking place along with computational and spectroscopic support for Dr. **Yi Liao** in his study of photoacids. Although he plans to retire in May 2016, he hopes to keep active in these research projects and assist the Department in other ways.

Dr. **Al Brown** and his group continue their long-running collaboration with the Baum Group on sensors, with three new sensor compounds under construction. He has started a new collaboration with biologist Drew Palmer on quorum sensing; his collaboration with Ashraf Aly's group, on NMR of heterocycles, has produced seven more papers, and he'll be joined in January by a postdoctoral fellow.

Three group alumni have new positions. Scott McKay (Ph.D. '95) is dean of science and engineering at Southern Arkansas University, Magnolia, Ark.; Aliea Hernberg (B.S. '06, Ph.D. '11) is a senior lecturer at the South Dakota School of

Mines and Technology, Rapid City, SD; and Dan Vorisek (B.S. '07, M.S. '12, Ph.D. '14) is a faculty member at Keiser College in Melbourne.

Dr. **Michael Freund** is rebuilding his group at Florida Tech with the support of an NSF grant (\$200k). This work on membranes for artificial photosynthesis involves a collaboration with researchers at Caltech, MIT and Simon Fraser University as part of the larger NSF Center for Chemical Innovation – Solar Fuels. New projects are also being developed on electrocatalytic reduction of carbon dioxide in collaboration with Jonathan Mbah (Florida Tech-CHE) and researchers at Florida Polytech as well as a project on artificial olfaction with Anthony Smith (Florida Tech-ECE) and researchers at the University of Manitoba. During the past year, his group has published 12 articles in high impact journals including *ChemSusChem* and the *Journal of Physical Chemistry* with an additional 6 articles under review.

Dr. **Andy Knight's** research group uses highly functionalized alkane thiols for capping gold nanoparticles for applications in homogeneous catalysis. The group has recently prepared a series of bipyridine-functionalized phosphonic acids which have proven easier to synthesize and purify. Phosphonic acids also have the added benefit of stabilization of core shell M@TiO<sub>2</sub> (M = Ag, Cu) particles. Dr. Knight's group with collaborators at the Naval Research Laboratory plan to attach functionalized organophosphonic acids onto the TiO<sub>2</sub> shell for supporting homogeneous catalysis, expanding the scope of metals that can be used for laser-mediated catalysis and expand the scope of catalytic transformations (i.e. alternatives to hydrolysis) such as oxidation and C-C bond formation.

Zhouzhi Wang, a Ph.D. student in the research group of **Yi Liao**, published his first paper as a first author in *Chemistry – a European Journal* regarding a photosensitive fragrance releasing polymer. Nawodi Abeyrathna, also a Ph.D. student, published her first paper as a first author in the prestigious *Journal of the American Chemical Society*. Professor Hongbin Chen from Xiamen University visited the Liao group and spent a year at Florida Tech working on photo-responsive materials and catalysts.

**Gordon Nelson**, Dean of the College of Science (1989-2010), Vice President for Academic Affairs (2011), and University Professor of Chemistry since 2011. Dr. Nelson completed his two year plus term as President of the Council of Scientific Society Presidents at the end of February. Dr. Nelson will co-chair a symposium on Fire and Polymers (VII) at the ACS National Meeting in Philadelphia, in August 2016. Drs. Nelson and **Feng Yang** were awarded a \$125k NASA STTR Phase I grant, a \$700k Phase II grant and recently follow on \$350k Phase IIE grant on highly flame retardant flexible polyurethane foams for energy absorption applications. The Phase II grant was one of only 14 awarded in the US and the only one awarded at a Florida university. Phase IIE is half funded by industry.

Associate Professor **Nasri Nesnas** continues his research activities in vision and neuroscience. He is proud of his recent 5 Ph.D. graduates over the past 5 years (see New Panther Chemists above). Richard Comitz (M.S. '05, Ph.D. '13), Yannick Ouedraogo (M.S. '11, Ph.D. '12) and Nesnas published work on molecular tools needed for brain mapping research, in *Anal. Chem. Res.* Nesnas was awarded a National In-

*Continued on Next Page*

**With Deepest Regrets** - It is with deepest regrets that the untimely passing of members of our Florida Tech Chemistry family is noted. Melissa Baum, wife of Clayton Baum, and Cindy Babich, wife of Michael Babich passed away January 2013 and February 2015, respectively. Melissa and Cindy worked together locally as psychologists but most of us will remember them from the enjoyable parties these two wonderful women hosted for the Chemistry Department at their homes. This year we also lost Lois Zabor, our chemistry administrative assistant for many years. Lois had moved to Australia upon retiring and was living with her daughter Kerry and family. Some of you "old timers" may remember Dr. Rick Langler (deceased February 2014) who came to Florida Tech in 1982, taught organic chemistry while involving many students in his organosulfur research, and returned to Canada in 1988. All of these Panther Chemists will be greatly missed, and the Chemistry Department extends our deepest sympathies to the friends and family of these special people who have touched our lives so deeply.

#### Department News

(continued from previous page)

stitutes of Health grant to research this area. He also completed his first sabbatical at Cal Tech in the Fall of 2014 and summer 2015 in the labs of professor Brian M. Stoltz on a collaboration with Nobel Laureate Robert H. Grubbs. Stoltz will present the 2015-2016 A. H. Blatt Seminar (recently given by Grubbs himself).

**Joel Olson's** research group achieved a major breakthrough in their NSF-funded development of a new approach for molecular design. This resulted in a US provisional patent (US 62/184,457) obtained in July of 2015 with co-inventors Dr. **Clayton Baum**, Dr. Mark Novak (now with South Dakota School of Mines and Technology), Dr. Raymond Terry (M.S. '11, Ph.D. '15), and Dr. Krishnan Sriraman (Ph.D. '13). The group published a paper in *J. Phys. Chem. C* (2015) providing experimental and theoretical foundations for tunneling barrier measurements of molecular monolayers. Co-authors included Dr. Baum, Flaminia Marrucci (B.S. '14, now a Ph.D. student at NYU), Nathan Price, Elizabeth Stuart, and Ph.D. student Xixuan Guo as first author. The Olson group also continues a collaboration with Oak Ridge National Laboratory; last summer, Xixuan Guo spent two weeks there collecting data using their LT-UHV STM.

**Joe Rokach's** research group continues work on asthma antagonists with collaborator Dr. William Powell, of McGill University. They have continued to improve the potency of the compounds which have been patented, with a second patent in the works (US 8,809,382; US 62/140,732). Grants include \$300k from the Canadian government and \$680k from a Canadian venture capitalist to support treatment trials at UC Davis, and recently the American Asthma Foundation awarded Rokach a continuation grant of \$150k. Recent publications include

*Aging Cell* (2013); *J. Med. Chem.* (2013); *Anal. Chem.* (2013); *Prog. Lipid Res.* (2013); *J. Med. Chem.* (2014); *ACS Med. Chem. Lett.* (2014); *Bioorg. Med. Chem. Lett.* (2014); *Biochim. Biophys. Acta* (2015); and *Biochem. Pharmacol.* (2015).

Dr. **Mary Sohn** served as interim department head for the fall 2014 and spring 2015 semesters after Dr. Babich retired, and is very relieved that Dr. Freund is now settled in as our permanent department head. She is enjoying having more time to spend on research and teaching.

The properties of organic molecules that are indispensable in medicine are intimately related to their shape. As such, the research in Dr. **Norito Takenaka's** group is dedicated to the preparation of molecules with the desired three-dimensional structure. Researchers in his laboratory have developed a new class of artificial enzymes that allow chemists to take readily available materials and convert them to value-added compounds that can be used to access precious medicinally active agents. With the research fund from NSF, his group continues to explore the potential of their artificial enzymes to synthesize valuable organic molecules that are currently impossible to make.

**Rudi Wehmschulte's** research group continues their work on a project dealing with the synthesis of low oxidation state gallium and indium. Funded by the Petroleum Research Fund (\$100k) the project is progressing nicely and has led to a recent publication (*Inorg. Chem.* 2015, 54, 9195-9200). Similarly, the synthesis of very strong cationic Lewis acids led to the isolation of interesting novel materials such as the polymeric  $[\text{Et}_2\text{Ga}][\text{CHB}_{11}\text{Cl}_{11}]$ , which are catalysts for the reduction of  $\text{CO}_2$  to methane.

**Kurt Winkelmann** continues his research in chemistry and nanotechnology education. His students design new experiments for general chemistry and nanotechnology lab courses.

## Alumni Focus – Dr. Tracy Gibson

After completing his Ph.D. and postdoctoral work in chemistry (working on fluorescent sensors with Drs. Baum and Brown), Tracy Gibson (Ph.D. '99) joined ASRC Aerospace, a research company that was contracted through the Kennedy Space Center. He is now a Subject Matter Expert 3 (Senior Technical Specialist) for Vencore, Inc., and is the Chemical and Biological Sciences Technical Lead for the Engineering Services Contract at Kennedy Space Center. Dr. Gibson is listed as an inventor on more than 10 patent applications and as an innovator on over 50 New Technology Reports. He received the NASA Exceptional Public Service Medal in 2010, and the NASA KSC Engineer/Scientist of the Year Award, Contractor Category, in 2009.



He has developed strong overseas collaborations; this summer, a German student visited his lab for a month. He also attended a science education research conference in Finland and will travel to Israel in December 2015 for another conference. Students in the Winkelmann group are also performing chemical research. Lenny Bernas (B.S. '15) studied the effects of nanoparticles on the growth of plants, which has applications in phytoremediation and understanding the environmental impact of nanomaterials. Students help Dr. Winkelmann perform stability tests of aviation fuels with funding through the FAA, and they synthesize nanoparticles for a NASA project performed with Dr. **Rudi Wehmschulte**.

### Give to the Chemistry Department Directly via Endowments.

**The Paltzik Endowment:** Endowed by the family of Alan Paltzik and alumni. Supports outstanding incoming graduate students.

**The Baum Endowment:** Endowed by alumni. Provides scholarship award(s) for the outstanding junior undergraduate student(s).

**The Johnathan B. Zung Family Scholarship Endowment:** Endowed by Dr. Johnathan Zung (B.S. '86). Provides support for a freshman undergraduate student.

**Chemistry Endowment** (Blatt Seminars): Endowed by Organic Syntheses and alumni. Provides funds to host a world-famous speaker in organic chemistry research.

**Sharma Endowment:** Endowed by New York Community Trust Funds. Supports research in environmental remediation and Fe chemistry.

**Mrs. Krishna Devi Sharma Fellowship Endowment:** Endowed by Dr. Virender Sharma. Provides support for a Ph.D. graduate student.

**Martin Zung Memorial Chemistry Award:** Endowed by Dr. Jonathan Zung (B.S. '86). Supports a junior/senior undergraduate student.

**For more information contact Dr. Michael Freund at [msfreund@fit.edu](mailto:msfreund@fit.edu)**



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## **From the Department Head**

Greetings:

There have been major changes in the Department since our last newsletter with the departure and arrival of new faculty and a growing number of graduate and undergraduate majors. We wish all the best to Drs. Sharma and Novak who have moved to other opportunities. We are also adjusting to the retirement of Dr. Babich who led the Chemistry Program for 30 years, and bracing ourselves for the retirement of Dr. Baum at the end of this year after 37 years of service to the university. Needless to say we are hard at work recruiting new faculty and instructors. Dr. Smeltz has been a strong addition as an Instructor and has already received a teaching award. Dr. Saleh, who some of you may know as a recent graduate of our Department, has also joined the Instructor ranks as a Visiting Assistant Professor. Dr. Takenaka, formerly with the University of Miami, has joined the faculty as an Associate Professor teaching and performing research in organic chemistry. I arrived this summer, and



with Dr. Sohn's help as interim Head, I am getting my research group established and learning the subtleties of running the Department.

The transformation that we are experiencing is both exhilarating and full of promise. Our connection with alumni will play an important role in this transformation and we are looking forward to hearing about your careers and families. When possible we hope that you will visit us to see what is going on and to meet the new additions. We are expecting continued growth of the Department and are looking forward to your involvement. All the best in your continued success.

--Dr. Michael Freund

**Editor's Corner** This will be my last contribution to the Editor's Corner since I will be retiring in May 2016. I turn the task of editor over to Dr. Joel Olson, who in truth has been the driving force for the newsletter the past few issues. Thus, I know that the newsletter is in very capable hands. As I look back at my 37 years at FIT, my greatest rewards have been my interaction with all of you as students and following your accomplishments as alumni. Thank you for that privilege!

--Dr. Clayton Baum