

Fall 2010

BME STATS Fall 2010

Department of Biomedical Engineering, Florida International University

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GRADUATE STUDENTS SPOTLIGHT

>> Yalin Ti



After I received a dual bachelor's degree in mechatronic engineering and industrial engineering, I worked as a mechanical design engineer in China for three years. Similar to many young people who dream to go as far as they can and do not want to rest on their laurels, I made the decision to further my graduate study in biomedical engineering in the United States.

In 2005, I joined the biomedical optics laboratory of Dr. Wei-Chiang Lin to develop a new technique based on optical spectroscopy, for in vivo myocardial tissue characterization. It was a wonderful experience for me not only because I got the chance to get into the field of biomedical optics, but also because, with the guidance of Dr. Lin, I gradually built the positive attitude and confidence towards systematically managing a long-term project in my life, that of acquiring a PhD which could prove to be a very challenging and tedious task.

Since successfully defending my PhD dissertation in 2009, I have been working

to extend my research in biomedical optics by taking an adjunct postdoctoral researcher position in the Laboratory for Research on the Structure of Matter (LRSM), led by Dr. Arjun G. Yodh, and the Radiation Biology Laboratory in the Department of Radiation Oncology, led by Dr. Theresa M. Busch, at the University of Pennsylvania.

Currently, I am in charge of three collaborative projects between LRSM and the Department of Radiation Oncology. One is an integrated real-time tumor PDT monitoring system under development using DOS and DCS combined with a feedback control on PDT light delivery. Another is a mouse tumor PDT study being carried out to study the effects of parameters such as the drug-light interval and the drug dosage on the alteration of tissue conditions in PDT. Meanwhile, the spectroscopic system is tested in the clinical environment to assist monitoring the tissue



conditions in PDT on patients with tumors in the head and neck area. Through these projects, we will be able to gain a clear understanding of tumor tissue response to PDT and hence advance the efficiency of PDT treatment for tumors.

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>> Sarah Erickson



Sarah Erickson has always had a passion for problem-solving and creative exploration. While pursuing her bachelor of science in physics at the University of South Florida in Tampa, she worked for three semesters as an undergraduate researcher in the Novel Materials Laboratory under Dr. George Nolas. She performed research in materials for thermoelectric applications which contributed to a publication in the "Journal of Applied Physics" and her senior honors thesis, "Synthesis and Characterization of the Type I Clathrates $Ba_8Ga_6Si_{30}$ and $Ba_8Ga_6Ge_{30}$."

Having a strong desire to apply her physics background toward improving the diagnosis and treatment of human disease, she decided to pursue a PhD in biomedical engineering. "I believe that the greatest occupation a person can have is that which has the potential to alleviate human suffering." Erickson entered

the biomedical engineering PhD program at Florida International University in Fall of 2005 on a presidential fellowship and performed research in nuclear medicine under Dr. Anthony McGoron. She then went on to perform research in optical imaging toward breast cancer diagnosis under Dr. Anuradha Godavarty. "Having lost my own mother to breast cancer, I personally understand what the patient goes through and how the disease affects her and her family. Now I have the opportunity to help not only women with breast cancer, but also their family and loved ones and all those affected indirectly by the disease."

Erickson's work is currently funded by a pre-doctoral fellowship from the Department of Defense Breast Cancer Research Program. During her doctoral research, Erickson has received several national awards, including the Session Best Paper Award (14th World Multi-Conference on Systems, Cybernetics and Informatics, 2010); the Lydia I. Pickup Scholarship (Society of Women Engineers, 2009); the first place Doctoral Student Paper

Award (Southern Biomedical Engineering Conference, 2009); and third place Best Student Poster Award (National Institutes of Health Workshop, Bethesda, MD, 2009). Her graduate research has been published in six peer-reviewed journal publications and nine conference proceedings as well as presented at 11 national conferences including SPIE Photonics West BIOS (2009, 2010); Optical Society of America BIOMED (2010); and Radiological Society of North America (2008).

Upon completing her PhD, Erickson plans to pursue postdoctoral work and ultimately a professor position where she intends to continue research in improving cancer diagnostics. In addition to research, she is also passionate about teaching and mentoring students in coursework and research. "I have really enjoyed my experience teaching undergraduate students in medical imaging and optics courses, as well as mentoring both graduate and undergraduate students in my laboratory. It requires a lot of patience and dedication, but it is extremely rewarding."

BME AWARDS 2009–2010

Anthony McGoron, Associate Professor, and **Chenzhong Li**, Assistant Professor, are co-investigators with principal investigator **Joe Leigh Simpson** (Professor, College of Medicine) on a \$1.4 million grant awarded in July 2010 from the U.S. Army Research Institute of Environmental Medicine.

Anuradha Godavarty, Associate Professor, received a Wallace H. Coulter Early Career Award and was recently selected as one of three finalists for the Greater Miami Chamber of Commerce 2010 Health Care Heroes Awards. FIU filed one U.S. Non-Provisional and one U.S. Provisional Patent.

James Byrne, Research Coordinator, was awarded a grant from the FIU Technology Fee mechanism in the amount of \$11,299.50 for 2009-2010. This permitted obtaining 110 licenses for Labview and 45 concurrent licenses of Solid Works to be used college-wide.

Malek Adjouadi, Professor, and **Armando Barreto**, Professor, along with **Naphthali Rishé** (Professor, Computer and Information Sciences), received a \$2.9 million MRI award from National Science Foundation for the Development of an Instrument for Information Science and Computing in Neuroscience.

Wei-Chiang Lin, Associate Professor, renewed the Miami Children's Hospital Professorship in Neuro-Engineering.



STUDENT NEWS: AWARDS

STUDENT ACHIEVEMENTS

Sarah Erickson won a Department of Defense Pre-Doctoral Research Fellowship (2009-2011) from the DOD's Breast Cancer Research Program and the Lydia I. Pickup Scholarship for 2009-2010 from the Society of Women Engineers.

Reshmi Banerjee won the Best Poster Award in the March 2010 Waste Management (WM) conference in Phoenix, Arizona for her poster titled "Response of Hanford Site Soil Arthrobacter Isolates to Uranium Contamination."

SENIOR DESIGN EXPO AND COMPETITION, SPRING 2010



First prize: (L to R) Andrea Sanchez, Carolina Bautista, Felix Jauregui
Runners-up: (L to R) Andrea Rolong, Hernando Sala, Yasamin Soheyla Fatemian, Camila Ceballos

FIU-BME WALLACE H. COULTER BME EXCELLENCE UNDERGRADUATE SCHOLARSHIPS (\$5,000)

Aisha Moinuddin Anisley Valenciaga Norman A. Rivera
Andrew Musto Caterina Pette

FIU-BME NORMAN R. WELDON SUMMER RESEARCH INTERNSHIP

Konstantinos Sebekos (Dr. Nikolaos Tsoukias, mentor)
Kanwal Raja (Dr. Yen-Chih Huang, mentor)

OUTSTANDING UNDERGRADUATE

For Spring 2010: Jean Gonzalez
For Fall 2009: Vanessa Scagliati

OUTSTANDING GRADUATE

For Spring 2010: Xiaozhen You, PhD (Also won the college's Outstanding PhD Graduate Award)
For Fall 2009: Jiali Wang, PhD

GRADUATE DISSERTATION YEAR FELLOWSHIPS

Zhiqi Zhang Xiaozhen You
Ronald Gutierrez Poching Chen

To learn more about any of these awards, please visit www.bme.fiu.edu or contact us at **305.348.6950**

2010

[HTTP://WWW.BME.FIU.EDU](http://www.bme.fiu.edu)

DEPARTMENT OF BIOMEDICAL ENGINEERING NEWSLETTER

Integrating Academia, Clinical Medicine and the Biomedical Industry



Message from the Chair

It is with pleasure that I write this third and last chair's message for our department's newsletter and introduce our newly appointed chair Dr. Ranu Jung from Arizona State University's Harrington Department of Bioengineering in the School of Biological and Health Systems Engineering. She was also the co-director of the Center for Adaptive Neural Systems at ASU. At Florida International University, Dr. Jung will build on our current strengths in neurosciences and neuro-engineering, while at the same time add a new strength in neural adaptive control. Our current research strengths continue to focus on bio-imaging and bio-signal processing; bio-instrumentation, devices and sensors; biomaterials and bio-nanotechnology; and cellular and tissue engineering. This will be an exciting time as we transition to a new chair and build new research labs. I am also happy to report that this past year has been very successful for our department's academic and research programs. Our undergraduate program was reaccredited by the Accreditation Board for Engineering and Technology last year and we graduated the highest number of both bachelor and PhD students ever. Last year we also saw our highest level of research awards and expenditures as well as the highest number of faculty publications.

I was also honored to have been awarded the Outstanding Faculty Advisor to and then elected President of the Alpha Eta Mu Beta (AEMB) Biomedical Engineering Honor Society and I look forward to providing greater service at the national level. AEMB continues to add new chapters and become more nationally recognized providing greater benefits to its members and the profession.

The Department's collaborations with other colleges and departments, as well as industry

(continued on page 3)

New Chair of Biomedical Engineering Appointed

Dr. Ranu Jung has been appointed as the Wallace H. Coulter Eminent Scholars Chair of Biomedical Engineering and Chair of the Department of Biomedical Engineering starting in January 2011. Professor Jung is a leader in the rapidly expanding fields of Neural Engineering and Computational Neuroscience. Dr. Jung comes to FIU from the School of Biological and Health Systems Engineering at Arizona State University where she is the Director of the Center for Adaptive Neural Systems. The prestigious "New Florida Scholar's Boost Award," a Florida state program to attract nationally recognized faculty in health/engineering, has been awarded to the College for Dr. Jung.

"I am honored to have the opportunity to lead a dynamic and enthusiastic biomedical engineering department and a new research group that is truly integrated with the medical and health sciences. BME students, staff and faculty at FIU are ready to rise to new challenges and aspire to the 'Worlds Ahead' vision of the university. The time is ripe for innovative education of tomorrow's biomedical engineers and for knowledge discovery in signature areas of excellence that have translational research and development as a hallmark. **bme@fiu** will build a growing wheel of impact that expands across the region, state, nation and the world," said Jung.

Jung has been an entrepreneur and a leader in establishing academic, clinical and industrial partnerships in neural engineering and computational neuroscience research. She is actively engaged in the development of neuro-technology that is inspired by biology, is adaptive and could be used to promote adaptation in the nervous system to overcome neurological disability or trauma. Of special interest to her are bio-mimetic and bio-hybrid living hardware systems for sensorimotor control.

She currently leads a Bioengineering Research Partnership that is funded through a multi-year award from the National Institutes of Health. With this partnership, she and her team are developing a novel, fully implanted neural interface between a myoelectric prosthetic hand and peripheral nerves of below-the-elbow amputees. This translational R&D effort will deliver a unique neural-enabled prosthesis that provides sensation to users of prosthetic hands into clinical practice. Patent-pending technology includes novel electrode designs and methods of communication.

As president and co-founder of Advensys, LLC, she received Phase I and II funding from the U.S. Army to develop powered lower-limb splints for evacuating injured soldiers from the urban battlefield. This patent-pending technology also has promise for providing "crutch-free" walking after ankle injuries.

Jung received her PhD in biomedical engineering from Case Western Reserve University in 1991. She also holds a master's degree in biomedical engineering from Case and a bachelor's degree with distinction in electronics and communications engineering from the National Institute of Technology, Warangal in India.



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Biomedical Engineering STATS

Contributors: Dr. Anthony McGoron, T. LaShaun Wallace, Oscar Negret, Rafael Avalos.

Biomedical Engineering STATS, the Newsletter of the Department of Biomedical Engineering, is published annually.



Message from the President

>> *Manuela Roman*



Following the guidelines of our national chapter, the Biomedical Engineering Society (BMES) at FIU strives to facilitate the translation of current students into successful careers in clinical, industrial and academia paths. Keeping in mind the needs of both undergraduate and graduate students, BMES promotes educational as well as social events that will prepare its members to maximize their impact on society and human health.

As the 2010-2011 academic year continues ahead, the biomedical engineering society is excited about continuing the many initiatives specifically planned to accomplish the ultimate goal of benefiting and integrating undergraduate and graduate students alike. One of the most important goals to the E-board this year is to involve more of the student body in BMES-sponsored events as well as to seek diverse and relevant opportunities for students to explore the prospects of biomedical engineering and provide guidance in their career path. Among some of the initiatives planned for this year are workshops to improve communication and resume writing skills, activities to bring the BME faculty and student body together and events that will increase our visibility within the engineering community.

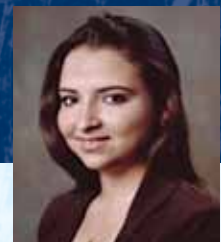
We extend an invitation to BMES to all those students that would like to gain invaluable skills and establish important professional relationships. Together we can improve on past efforts and make BMES an organization recognized university-wide.

2010-2011 BMES E-Board:

- Manuela Roman**, *president*
- Laura Fajardo**, *vice president*
- Aisha Moinuddin**, *secretary*
- Tatiana Bejarano**, *treasurer*
- Kathryn Parrilla**, *events coordinator*
- Andrew Musto**, *webmaster*
- Jerry Centeno**, *social chair*
- Andres Medellin**, *marketing representative*
- Alex Rodriguez**, *Council for Student Organizations representative*
- Anuradha Godavarty**, *faculty advisor*

Alpha Eta Mu Beta Biomedical Engineering Honor Society: Message from the President

>> *Ana Peña*



The past year has been an exciting time for Alpha Eta Mu Beta. At the 2009 Biomedical Engineering Society Conference in Pittsburgh, Pennsylvania, we received the Most Active Chapter Award and the Outstanding Community Service Award from the national Alpha Eta Mu Beta (AEMB). In Spring 2010, we were the most active society on FIU's main campus, out of 200 registered societies. The fact that our members remain involved after induction is one of the crucial strengths of this society. We organize member events on a regular basis and we want members to know that we appreciate their continued involvement. Another important fact is that our active members include both undergraduate and graduate students, so students at different levels have the opportunity to interact, network and form bonds. Thank you so much to all our members for helping us become a strong society, and thanks to our prior E-Board, including 2009-2010 president Alicia Fernandez-Fernandez, and to our advisor Dr. Anthony McGoron. We hope to be able to continue the good work.

One new activity that has received a great response from students is the "Industry Lecture Series." In these workshops, speakers from leading biomedical companies can interact with students and discuss issues of interests for those of you who want to work in the industry, such as interviewing or transitioning from school to a professional job. Another interesting project that took off in the previous year was a collaboration with Terra Environmental Research Institute, a biotechnology magnet high school. We have advised them in several projects and some of their students volunteered in the BME labs during the summer – we look forward to many exciting opportunities to interact and promote our department and the profession through this project. We have also continued to host our traditional activities, such as the monthly "Journal Club," open to anybody in the department who wants to learn about the latest advances in research, or the "International

Food Extravaganza," in which members have the opportunity to network and share dishes from different cultures. All these events are also open to any students in the department – even if you are not a member, feel free to participate!

So what's new for the upcoming academic year? We already have activities for students interested in research (the journal club) and those interested in industry (the industry lecture series). We believe there is an important third group of students in our department: those who have the goal of attending medical school. Starting this semester, we will organize a workshop in which these students can interact with admission committee members as well as students who have already gone through the application process. Our hope is to give the next wave of students a head start so that they know what they should be doing to prepare a successful application.

Another project in the works is a mentoring/tutoring program through which both undergraduate and graduate students can help other students excel and make progress in their studies. Send us your ideas or suggestions for what you want from this program!

We also want to offer opportunities for student and faculty interaction beyond academics. On Oct. 23, we hosted the first Student vs. Faculty Volleyball Game and BBQ and on Nov. 23, AEMB and BMES collaborated for a traditional Thanksgiving lunch.

Last but not least, we will continue to have member events to thank you for helping us be a strong, active society. Rock climbing, movie night and food events are some of the examples from past semesters. If you have ideas for events, we are open to suggestions.

If you are invited next semester, join us! We want to make a difference in our department and in the FIU community, and you could be a great asset. You can contact us at aemb.fiu@gmail.com or check out our website at <http://web.eng.fiu.edu/aemb/>.

ALUMNI NEWS: BME ALUMNI PROFILE >> *Werner Blumenthal*



I ended up choosing biomedical engineering because I felt it was the best of both worlds. Since I was a little kid, I was always interested in the medical field. First I wanted to be a neurosurgeon because

my favorite uncle had Down syndrome and I always fantasized about being able to "fix" it. Well fast forward ... I get sick at the sight of blood, therefore, no surgery. On the other hand, I was still fascinated with medicine and all of the seemingly sci-fi technology surrounding it. Biomedical engineering satisfied my interest in medical technology and also saved me from getting nausea at the sight of blood.

During my time at FIU, I was involved in several engineering societies including BMES, which exposed me to all the possibilities someone in this field had. These possibilities were even more apparent when we had to choose a senior design project. For our senior design project, we had to design an electromechanical interface for the Perfused Heart Langendorff apparatus which was in the BME lab. This gave me a taste for mechanical design which really piqued my interest and stayed on my mind. In addition, the senior design project also gave me a very real look into product development and design.

Overwhelmed, my senior year I applied to everything from Kimberly-Clark to Guident to Johnson & Johnson. With no idea about what I wanted to do, I took the job which was closest to home at Boston Scientific in Doral. The catch was that I was working as a consultant for a company called GCI doing quality engineering for Boston Scientific. The owner of this company played a big role in how my professional career unfolded. I saw firsthand how hard work could pay in a big

way. After slightly over a year of watching my boss' every move, I decided to look for my own contracts in the quality engineering field. Fortunately, I was able to land a couple of contracts within large- and medium-size companies to validate some of their products for use within medical device companies. In order to complete this work, I recruited some of the more experienced quality engineer consultants I had met over the course of my time at Boston Scientific and shipped them out to places as far as Japan.

On one of my business trips to secure more contracts, I encountered rapid prototyping. Rapid prototyping is a technology which has seemingly endless possibilities and will be a big player in the biomedical industry for years to come. This technology, though over 20 years old, is just recently becoming affordable to small and medium companies while still producing quality parts. I was able to secure some capital from the quality consulting jobs and put together a business plan in order to secure the distribution rights within the state of Florida for one of the industry leaders in Rapid Prototyping, 3D Systems. Since then, WB Engineering, Inc. was established as a full-fledged company with employees. Starting a

company which requires a significant amount of capital investment during the toughest economic times since the Great Depression was obviously not too easy. The first two years of business were tough, but now the company will be closing 2010 at close to \$1 million in annual revenue. Since the inception of the company, we have landed two more product lines which include Autodesk and 3Dconnexion. WB Engineering has also evolved in the sense that we have built a services company around the products we sell and support. We have been able to work with companies and individuals to design and prototype products in all industries from consumer products to medical devices (my favorite). Our services have proven to be a large portion of our success in terms of growth and profitability.

In addition to ensuring that WB Engineering, Inc., continues to grow into a successful company, I have stayed involved in the educational process of students by becoming a member of the BME advisory board, and have given guest lectures to BME students at FIU. We hope to make WB Engineering, Inc., a place that makes doing business a pleasure, as well as a great place to work.

rapid prototyping services



Message from the Chair (continued from page 1)

leaders, are expanding as biomedical engineering continues to be a strong pillar of the university. Our close collaboration with the Miami Children's Brain Institute was reaffirmed by the renewal of the MCH Professorship in Neuro-Engineering to Wei-Chiang Lin. We added one new assistant professor in each of the last two years and expect

to continue to add new faculty in the near future. As you will see this current newsletter focuses on our terrific students, both past and current. Our student societies have been very active as you will read about in the columns from the society presidents. They are an integral part of the department and are a magnet for student participation in departmental activities. We are lucky to have the most dedicated and hardworking faculty, staff and students. I would

like to thank all of the help that I have received in directing the department for the past three years and for helping to make the Biomedical Engineering Department the most exciting and productive department at the university. I look forward to accelerating the academic and research achievements with the appointment of the new department chair.

Dr. Anthony McGoron

FACULTY NEWS: >> *DR. SHARAN RAMASWAMY JOINS FIU*

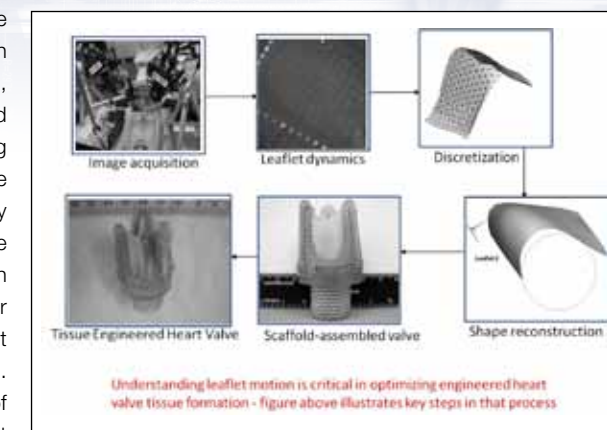


Dr. Sharan Ramaswamy is the newest faculty member to join the Biomedical Engineering (BME) Department. Dr. Ramaswamy obtained his bachelor's degree from Arizona State University in bioengineering followed by a master's in biomaterials from the National University of Singapore. Following a one-year research scholarship in total joint replacement, sponsored by the French government in Saint-Etienne, France, he then went on to the University of Iowa, Iowa City, where he finished his PhD in biomedical engineering in the area of cardiovascular mechanics under the direction of Professor K.B. Chandran. He then continued his postdoctoral training in the area of magnetic resonance imaging (MRI) microscopy, cellular MRI and cartilage tissue engineering at the Laboratory for Clinical Investigation, National Institute on Aging/NIH.

Prior to joining FIU, Dr. Ramaswamy was a visiting research assistant professor at the University

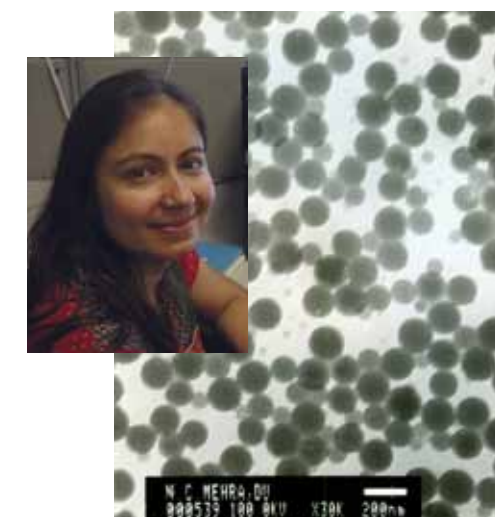
of Pittsburgh where he was able to integrate his diverse training in the areas of tissue engineering, biomechanics/mechanobiology and computational predictive modeling to the study of heart valve tissue engineering. He and his laboratory at FIU are currently investigating the nature and rates of tissue formation and associated fluid-induced shear stress environments on tri-leaflet tissue engineered heart valves (THEV). In addition the migratory effects of heterogenous cell populations that occur after TEHV implantation are also being investigated. This work is currently funded through a scientist development grant from the American Heart Association.

"My reasons to come to FIU stemmed from my knowledge that the BME department has had a track record of excellence particularly in cardiovascular engineering. I have been even more pleasantly surprised to note since working here that there are such vibrant biomedical industries in South



Florida who are enthusiastic about working with us. Most importantly I have found that the caliber and productivity of the students in our department to be second to none. I thus feel confident that our combined partnership (student-faculty-industry) will ensure that the work that we do here will have a positive national and global impact on our understanding of mechanoregulatory mechanisms in regenerative medicine and subsequently, to the delivery of health care at-large."

FACULTY FOCUS: >> *ROMILA MANCHANDA*



I received my undergraduate degree at the University of Delhi, which gave me a wonderful education. I received my master's degree from Delhi University and then earned my PhD in chemistry from the Institute of Genomics and Integrative Biology and University of Meerut, India.

The title of my dissertation was "Design and Synthesis of Polymeric Nanospheres as Carriers for Bio-molecules." During my doctoral dissertation, I prepared

biodegradable polymeric nanoparticles for the delivery of antisense oligonucleotides, proteins and other bio-molecules of pharmaceutical importance. As part of my training, I was fortunate to work at the Laboratoire de Physico-Chimie, Faculté de Pharmacie, Pharmaceutique et Biopharmacie, Université Paris-Sud X1, Chateaufort Cedex. The director of this institute, Dr. Patrick Couvreur, is world-renowned for the invention of polyalkylcyanoacrylate nanoparticles. My research during this period focused on the synthesis of oxygen carrier nanoparticles based on polyalkylcyanoacrylate coated with polysaccharides. The purpose of these modified nanoparticles was to serve as oxygen carriers for general transfusion purposes.

In November 2007, I joined FIU as the second BME Young Inventor Award recipient from proceeds from a \$1.5 million endowment from the Wallace H. Coulter Foundation. My move to FIU allowed me to tackle another new area: image-guided therapy. As a postdoctoral fellow in the Biomedical Engineering Department, I have focused on the preparation and characterization of novel nanoparticles which can simultaneously carry imaging/hyperthermia and chemotherapeutic agents to tumor target sites. My work involves cancer-related research including medicinal chemistry, cancer therapeutics and

diagnostics, and nano- and microparticle anticancer drug systems. Biomedical research is an area that attracts me professionally because it impacts people's lives and it gives me the opportunity to really make a difference. My mother struggled with breast cancer and with the devastating side effects of chemotherapy, and her battle has been an inspiration personally and professionally. Dr. Anthony J. McGoron has been an invaluable mentor with his extensive expertise in drug delivery and medical imaging, along with his patience and dedication to his laboratory and the department. At FIU I have learned new characterization skills and experimental techniques such as cell culture and animal studies, and I have gained valuable expertise in grant writing. I have also had the opportunity to interact with engineers, chemists, materials scientists and clinicians. Biomedical engineering is very multidisciplinary and it integrates different science and engineering knowledge and skills to solve medically related problems. This field provides me with the opportunity to work in a diverse team with experts that can complement my own strengths. I hope to learn much more in the time I spend here, and I thank everyone in the department and especially in Dr. McGoron's lab for welcoming me with open arms.