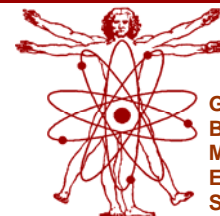




The Scope



Volume 3, Issue 2 - Fall 2009

New BME Student Teaching Lab Provides Hands On Experience

Conrad Zapanta, PhD

Teaching Associate Professor and Associate Head of BME

The BME Teaching Laboratory (BETL) was established in Fall 2006 for the initial offering of the BME laboratory class for undergraduates (42-203). After spending two years in Wean Hall, BETL moved to Smith Hall 125 (the former location of the Bone and Tissue Engineering Center) in Fall of 2008. The space was recently renovated in the summer of 2009 with the conversion of two offices into a student briefing and discussion room. The renovated rooms features seating for 19 students, a LCD projector, a document camera, speakers, and a VCR/DVD player. BETL has been the home for two laboratory classes: BME Laboratory (42-203)

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The 2009 National Biomedical Engineering Society (BMES) Student Chapter Award Presented to Carnegie Mellon

Rowena Mittal, MS

PhD Candidate of BME; Carnegie Mellon University; Advisors: Marcel Bruchez, Phil Campbell

GBMES was selected by the BMES Board of Directors as the recipient of the BMES 2009 Student Chapter Commendable Award. GBMES was awarded for its outstanding performance in enhancing the professional awareness and education of its members during the current academic year through a motley of activities ranging from qualifier practice sessions to the annual Carnegie Mellon Biomedical Engineering and Biotechnology Research Symposium (BEBRS). A plaque was presented to GBMES on Thursday October 8, 2009 at the BMES Awards Ceremony at the David Lawrence Conference Center in Pittsburgh, PA. More information about the professional and social activities hosted by GBMES can be found at: <http://www.andrew.cmu.edu/org/gbmes/>.

GBMES' BMES 2009 Student Chapter Commendable Award would not have been possible without the support of many people from the Carnegie Mellon BME community! First,



The 2008-2009 administrative board of GBMES at Carnegie Mellon University is presented the 2009 Commendable Student Chapter Award from the National BMES. Individuals from left: Phil Leduc PhD, Aditi Sharma, Yajuan Wang, Sanna Gaspard, Usha Kuppuswamy, Rowena Mittal, George Truskey PhD.

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GBMES would like to thank the general body who helped make the organization a success through participation. I would like to acknowledge all the graduate students who dedicated their free time and shared their BME spirit while serving on the GBMES administration since its inception – making this national recognition possible: founding executives Sanna Gaspard, Amina Chebira (PhD '08), Rowena Mittal, and Elvira Osuna Highley (PhD '08); and past executives Chris Highley, Sasha Bakhru (PhD '09), Jonathan Didier, Beautia Dew, Luke Xie (MS '08), Davneet Minhas, Justin Newberg (PhD '09), Vamshi Beeravelly, Aditi Sharma, Usha Kuppuswamy, Ryan Kellogg, Lyndsey Schutte, and Yajuan Wang.

GBMES would also like to give special thanks to Prof. Jelena Kovacevic, Prof. Phil LeDuc, and all the BME faculty who have encouraged and supported the organization through its past four years of growth. We would like to recognize and thank the Department of BME, Prof. Todd Pryzbycien (previous department head), and Prof. Yu-li Wang (current department head) for past and continuing support. Finally, GBMES thanks BME staff Brendan Kerr, Denise Murrin-Macey, and Vanessa Calvin for their time and help which supports GBMES activities. Congratulations to the Carnegie Mellon BME community! ♦

New BME Graduate Students

Eighteen new graduate students were accepted into the BME department. The PhD students admitted in the Fall of 2009 have an avg. GPA of 3.76 and average GRE scores of: Q:784, V:594, A:4.69. The newly admitted PhD students will spend their first month interacting with various BME professors before picking a faculty advisor and research project.

Mary Beth Wilson



I am from Bridgeport, WV. I graduated from Carnegie Mellon in 2007, majoring in Materials Science & BME. My research interests include cellular biomechanics and its application to biomaterials design for tissue engineering.

Amsul Khanal



I am Amsul Khanal, from Kathmandu, Nepal. I received my B.S. degree in Biology from Xavier University in Cincinnati. My hobbies include watching soccer and F1 and listening to classic rock, particularly

GBMES EXECUTIVE BOARD

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AC/DC, Led Zeppelin and The Doors.

William Kowalski



I am from New Jersey and completed my B.E. in BME at Stevens Tech in 2008. My research interests in BME focus on medical instrumentation and biomechanics.

Richard Taylor



I grew up in Irvine, California. I have a B.A. in engineering-physics from Westmont College and a B.S. in BME from the University of California, Irvine. My primary research interests are tissue engineering.

Chia-Yuan Chen



I am from Taiwan. Before 2009, I worked in UMC (United Microelectronics Corp.) as a photolithography process engineer. After that, in 2009, I started my Ph.D. career in CMU. My research interests include microfluidics, microPIV, and microdevices.

Brian Holt



I was born and raised in Pittsburgh and attended Case Western in Cleveland where I earned a BSE in BME. I am returning to Pittsburgh for grad school and focusing on tissue engineering/polymeric biomaterials research.

Ian Hoffecker



I am from Colorado where I attended the University of Colorado Boulder and received a B.S. in chemical engineering. My hobbies are digital painting, running, and martial arts.

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My research interests are biomaterials and tissue engineering.

Other graduate students admitted into the BME department at Carnegie Mellon include:

- Frank Yeh
- Khyati Mohanty
- Seyed Jamaly
- Satish Ramakrishnan
- Philip Short
- Eric Hsu
- Reva Street ◊



Biomechanics Research Builds Momentum at Carnegie Mellon

Kris Dahl, PhD

Assistant Professor of BME, Chemical Engineering, and Materials Science & Engineering

With the successes of many Bioimaging Days and last year's Biomaterials Day, we were inspired to organize a day to exchange ideas of biomechanics research. When we finally made a list of all of the researchers in the Pittsburgh area, even at Carnegie Mellon, who were working on biomechanics topics, it seemed like a week would have been more appropriate. Since Prof. Yu-Li Wang had just joined the department as the head, we decided to format the talks around the small scale biomechanics in homage to Prof. Wang's cell mechanics legacy. The first Biomechanics Day is thus: Micro-biomechanics: Thinking Big and Measuring Small. The talks feature professors from math, chemistry, biology, computational biology, mechanical engineering, surgery and of course BME. The breadth of backgrounds has led to a unique interaction of thoughts and ideas. We also hope that collaborations will be forged from discussions held during the meeting and afterward.

My favorite part in organizing a day like this is seeing the enthusiasm of the presenters when getting involved. Professors starting their careers as well as the most senior established professors all enthusiastically offer support to the meeting. Researchers from both CMU and PITT understand the potential of this meeting in bringing together people of like interest and complementary skills, and everyone is looking forward to presenting their latest finds and brainstorming new ideas. It is this spirit of enthusiasm, collegiality and collaboration that drives research within Carnegie Mellon BME and allows its presence to be felt throughout its

sister departments. For more information visit: <http://www.bme.cmu.edu/research/biomechanicsday2009.pdf>. ◊

Spotlight on BME Achievements at Carnegie Mellon



Professor Bob Tilton, PhD, Professor of BME and Chemical Engineering

- Has been named to the National Institutes of Health Nanotechnology Study Section for the term 2009-2013. This study section helps set research directions for novel approaches to solving problems in medicine and biology based on nanomaterials and nanoscale devices.

Sanna Gaspard, MS, PhD Candidate of BME; Advisor: Todd Przybycien

- Was selected from over 240 applicants for one of the 18 Graduate Students Awards presented by the National BME Society (BMES) to recognize quality of research and promising student researchers.

Alexandre Ribeirio, PhD Candidate of BME; Advisor: Kris Dahl

- Was awarded the fellowship entitled Bolsa de Doutorado (PhD stipend) for Independent Study on the Field of Biochemical Engineering and Biotechnology from the Fundação para a Ciência e Tecnologia agency.

BME Spotlight - Continued on page 7

The Downturned Economy and BME: Academic and Industry Perspectives

Academic Perspective



George Truskey, PhD

Chair, Department of BME at Duke University; President of the National BME Society.

During the past ten years the number of BME faculty positions increased significantly as new BME departments formed. That growth ended as the current economy has placed significant constraints on the budgets of many universities, especially public institutions. At the same time, the American Recovery and

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Reinvestment Act (ARRA) provided a significant short-term boost in NIH funding. As a result, research funding to many BME departments is likely to increase over the next two years. Since almost all junior faculty positions in BME now require postdoctoral experience, the current NIH funding situation provides new positions to prepare PhDs for faculty positions. Although some ARRA funding is directed to new faculty lines, uncertainty about future NIH budgets and the financial condition of many universities may limit the number of new faculty positions for some time to come. There are likely to be fewer openings in industry as well.

Regardless of the economy, career planning should be an ongoing process and you need a flexible approach to achieve your career goals. There are many other career opportunities in law, business and public policy in which an engineering degree is an asset. International research opportunities are available through the Whitaker International Scholars Program (www.whitaker.org/program_overview.html) and other research exchange programs (www.iie.org).

As president of the BME Society, I am acutely aware of the challenges facing students looking for employment during the current economic conditions. At our annual meeting, held in Pittsburgh October 7-10, 2009, we had several events to assist with career planning and finding a job. The Southeast BME Career Conference (SEBECC) will be held in Washington on October 30 (www.sebecconference.org) and the meeting focuses on career planning and opportunities for BME students. Both events will have networking opportunities. You should consider the current economy as a challenge and an opportunity. Because you need to plan and the positions are fewer, you cannot just proceed into your first job without some careful self-assessment and preparation. Identify the attributes that you want in your first position, network at your school and at meetings. In many cases, industry positions may not be advertised, so contacts and networking are essential.

Industry Perspective



Thomas E. Dudar, PhD

Chemical Engineering-Biomedical Engineering
Alum - PhD1980
Baxter Distinguished Engineer
Applied Science & Technology
Device Center of Excellence
Baxter International Inc

The U.S. unemployment rate has doubled to 9.7 percent over the last 1½ years.

How does this affect the employment outlook for biomedical engineers (BMEs) and is there hope?

According to the U.S. Department of Labor's Bureau of Labor Statistics (BLS), BMEs accounted for approximately 1 percent of the 1.5 million engineering jobs held in 2006. BME jobs were forecasted to grow 21 percent during 2006-2016, which is almost twice the projected rate of 11 percent for engineering jobs in total. However, because of the growing popularity of this field, the number of degrees granted in BME has and will increase greatly. BMEs, particularly those with only a bachelor's degree, may face growing competition for jobs. The average starting salary in 2007 was \$51,356 with a B.S. and \$59,240 with a M.S. The median earnings for all BMEs in May 2006 were \$73,930. This number increased 5 percent to \$77,400 in May 2008. The mean was \$81,120, with those working in the scientific R&D sector earning on average \$88,660, followed by medical equipment manufacturing at \$83,760, and pharmaceutical manufacturing at \$78,940. The least paid sector was medical and surgical hospitals at \$62,850. The BLS may revise its forecasts in light of the current recession.

As is typically the case, the greater the challenges, the greater the rewards. The healthcare industry, and BMEs in particular, should benefit from incremental demand afforded by the demographics of aging populations and emerging markets around the world. BMEs are well positioned to leverage the rapid advances in and the convergence of engineering disciplines, information technologies and medical sciences into new diagnostics and therapeutics, including biologics, drugs, devices, and combination products. BMEs will play a significant role in effecting one of the potential mandates of healthcare reform, namely improving clinical outcomes while reducing total costs. Two examples of this include medication error reduction and reducing healthcare acquired infections. BMEs can also assist the FDA in its mission to protect the public health by taking personal accountability for researching, designing, and developing safe and effective products and processes. It's interesting to also note the expanded definition of effective in the FDA's mission now includes cost-effectiveness.

I would like to move from government forecasts and generalities to a real world example of one company's strategy to meet the challenges of the current environment. Baxter International

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Inc. develops, manufactures and markets products that save and sustain the lives of people with hemophilia, immune disorders, infectious diseases, kidney disease, trauma, and other chronic and acute medical conditions. As a global, diversified healthcare company, Baxter applies a unique combination of expertise in medical devices, pharmaceuticals and biotechnology to create products that advance patient care worldwide.

While the stock market as a whole has performed abysmally over the last three years (2006-2008) with the Dow losing 12 percent and the S&P 500 losing 23 percent, the S&P 500 Healthcare Index did relatively better, losing only 11 percent and Baxter did significantly better, gaining 48 percent. Innovation is the driving force behind Baxter's success. The company is a technology leader in the development of recombinant and plasma-derived therapeutic proteins, cell culture-based vaccines, intravenous and dialysis solutions, drug packaging and delivery systems, and many other areas. Baxter's businesses share expertise in medical plastics, biologics, sterilization and other scientific disciplines to create unique life-saving products. To fuel this innovation, Baxter has decided to steadily grow its investment in R&D, posting an 18 percent compounded annual growth rate (CAGR) over the same three year period.

As part of this investment, Baxter revived its university relations strategy in 2006 to align with the company's overall talent acquisition plan. As a result, the overall participation in the Corporate Internship/Co-op Program more than doubled over the past three years. The total number of engineering students has had a moderate increase, while the number of biomedical engineers has doubled, accounting for nearly half of the engineering interns this year as indicated below:

- 2007 - 26% of engineering interns/co-ops were BME
- 2008 - 28% of engineering interns/co-ops were BME
- 2009 - 46% of engineering interns/co-ops were BME

In 2009 Baxter implemented a two-year technical engineering development program focused on growing high potential, entry level talent who are passionate about technical design and saving lives, and who have the desire to strive

to create innovative, quality products. The rotational program is designed to accelerate the member's development by exposing them to Baxter's technical businesses through a variety of critical assignments and targeted technical training.

In closing, I would like to say, "Congratulations, you have chosen a noble profession with a bright future!" In contrast to the current broad economic environment, I hope I have illustrated the opportunities that await you in BME. My advice for a successful career path for biomedical engineers just beginning their careers is simple. Look for a company that attracts top scientific and engineering talent and that invests in their growth and development. Broaden your technical base; develop expertise in certain key areas; gain clinical exposure; practice continuous learning; be open to new experiences; and interact with all functions within the company. ♦

Strong Representation of Carnegie Mellon BME at the National BMES Conference



This article features the participation of Carnegie Mellon's Department of BME in the 2009 National BMES Conference with a highlight on the BME graduate students who delivered a poster or podium presentation.

Sanna Gaspard, MS

PhD Candidate of BME; Carnegie Mellon University; Advisor: Todd Przybycien

Carnegie Mellon's BME Department contributed to a total of 78 presentations at the National BMES Conference in Pittsburgh, PA on October 7-10th, 2009. Twenty-four current BME graduate students participated highlighting the exciting research ongoing at Carnegie Mellon ranging from image processing and stem cell research to medical device development. Eight graduate students gave podium presentations and eighteen graduate students presented posters, representing 72% of the current BME graduate population, not recounting the two students who presented both a poster and podium presentation and excluding the newly admitted first year students. The Carnegie Mellon BME graduate presenters are listed below based on first authorship in the 2009 BMES technical program. The BME undergraduates also contributed significantly to the BMES conference as volunteers wearing the bright Carnegie Mellon

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BME Department T-shirts.

Podium Presentations

• Judy Shum OP 8-3-8F	• Charles Jackson OP 10-2-2C
• J. Kim OP 8-2-4E	• Jonathan Didier OP 8-1-6C
• Paul Glass OP 10-2-6C	• Usha Kuppuswamy OP-9-2-7F
• Liang Tso (Steve) Sun OP 8-3-9B	• Samuel Hund OP 9-1-5B OP 9-1-5C

Poster Presentations

• Pedro Alvarez PS 8A-39	• Dennis Trumble PS 9A-70
• Yajuan Wang PS 8A-63	• Minhua Qiu PS 8B-105
• Andrew Rape PS 8A-73	• Cheng Chen PS 9A-84
• Alexandre Ribeiro PS 8B-27	• Bur Chu PS 9A-127
• Sanna Gaspard PS 10A-121	• J. Kim PS 9A-47
• Samuel Hund PS 9A-42 PS 10A-24	• Agnieszka Kalinowski PS 9B-36
• Chris Highley PS 9B-182	• Rowena Mittal PS 8A-89
• Daniel Delubac PS 9B-94	• Wei Wang PS 8B-93
• Onur Dur PS 8B-48 PS 8B-194 PS 9B-52	• C-M. Cheng PS 9B-32 PS 9B-100 PS 9B-194

For more information on BMES visit:
<http://www.bmes.org/>. ♦

Student Awards Presented at the 4th Annual Carnegie Mellon BME & Biotechnology Research Symposium

Rowena Mittal, MS

PhD Candidate of BME; Carnegie Mellon University; Advisors: Marcel Bruchez, Phil Campbell

On April 23, 2009 GBMES hosted its 4th annual student-run Biomedical Engineering and Biotechnology Research Symposium (BEBRS). GBMES was very excited to welcome Prof. Shu Chien of UCSD (and previous president of national BMES) as the keynote speaker. He gave a presentation entitled, "Biomedical Sciences and Engineering in the New Century." During his visit Prof. Chien gave a students-only seminar where he kindly shared his career journey and elaborated upon his "7 C's" for achieving career goals: Commitment and Compassion for whatever we choose to do, Comprehension of what is known and what needs to be done, Creativity in designing and executing our work, continuous improvement of our Communication skills and Cooperation with others, and Completion of whatever we set out to do. Upon his departure, Prof. Chien noted that BEBRS 2009 was, "truly outstanding!"

GBMES witnessed a 40% increase in student participation in BEBRS over the previous year and introduced a new initiative to the program: a Networking Mixer with the BioPharma Business Club at Tepper and Gold Sponsor ThermoFisher Scientific. The following students, faculty, and staff were recognized during the 2009 BEBRS for the quality of their research or support of the graduate students:

- **1st Place Podium Presentation:** Teresa Kirschling, ChemE PhD Candidate, for her talk entitled, "The Impact of Reactive Iron Nanoparticles on Microbial Diversity in Aquifer Soils" (Advisors: Professors Robert Tilton, Gregory Lowry, and Edwin Minkley).
- **2nd Place Podium Presentation:** Gail Siewiorek, BME PhD Candidate, for her talk entitled, "In vitro performance assessment of embolic protection filters under pulsatile flow conditions" (Advisor: Professor Ender Finol).
- **1st Place Poster Presentation:** Onur Dur, BME PhD Candidate, for his poster entitled, "Effect of Caval Waveform on Energy Dissipation of Failing Fontan Patients" (Advisor: Professor Karem Pekkan).
- **2nd Place Poster Presentation:** Shweta

Continued on page 7

Shah, ChemE PhD Candidate for her poster entitled, "Protein Structure Alignment using Contact Maps" (Advisor: Nikolaos V. Sahinidis).

- **BME Grad Faculty Appreciation 2008-2009 Awards:** Professors Todd Pryzbycien, Jelena Kovacevic, and Stephan Zappe.
- **BME Grad Staff Appreciation 2008-2009 Award:** Brendan Kerr, Graduate Studies Coordinator.

The symposium would not have been possible without funding and support from GBMES, BME Grad volunteers, the BioPharma Business Club of Tepper, the Department of BME, the Student Senate Joint Funding Committee (JFC), the Graduate Business Association (GBA), and Gold Sponsor ThermoFisher Scientific. ♦

New BME Student Lab - Continued from page 1

and Biomaterials and Host Interactions (42-419). BETL has facilities for cell-culture activities (biological safety cabinets and incubators), microscopy (phase-contrast and fluorescence), and various other BME experiments (such as electrocardiography and electromyography). Additional equipment purchases are planned to permit other types of experiments to be performed. The establishment and renovation of BETL will significantly enhance both the undergraduate and graduate curriculum by providing facilities for laboratory experiences that supplement classroom work. Several other BME classes, such as Medical Devices (42-444/744), Rehabilitation Engineering (42-347/747) started using this space (see figures below) in Fall 2009. Many other BME classes are being modified and developed to utilize this important facility.



Left. BME student laboratory used by undergraduate BME students. Right. BME student briefing and discussion room. ♦

BME Spotlight - Continued from page 3

Professor Gustavo Rohde, PhD, Assistant Professor of Biomedical Engineering

- Has been awarded an NIH R21 grant, entitled,

"Deformation-Based Computational Morphometry for Cell Biology Applications" to develop informatics tools for analyzing cell biological images.

Professor Jelena Kovacevic, PhD, Professor of BME and Electrical & Computer Engineering

- Was a plenary speaker at the symposium "Twenty Years of Wavelets", held in May in Chicago, IL, as well as at the annual meeting of European Women in Mathematics, held in August in Novi Sad, Serbia."
- Has a publication among the top 100 most downloaded on IEEE Xplore from Nov 2008-Apr 2009 (even though it only appeared in May 2009). The publication reference: P. Vandewalle, J. Kovacevic and M. Vetterli, "What, why and how of reproducible research in signal processing," IEEE SP Mag., May 2009, pp. 37-47.

Agnieszka Kalinowski, PhD Candidate of BME; Advisor: Kris Dahl

- Is a recipient of the NIH F-30 NRSA Ruth L. Kirschstein Award. Award Number F30AG030905 from the National Institute on Aging.

Professor Jim Antaki, PhD, Professor of BME and Computer Science

- Was awarded a grant for \$368,158 from NIH/NHLBI through the American Recovery and Reinvestment Act to expand his ongoing research in multi-scale modeling of blood flow to include the study of the physical properties of malaria-infected blood cells. This award will provide support for Dr. Alberto Gandini, a physicist, who aid the development of a blood filtration system to treat malaria.

Wei Wang, PhD Candidate, BME: Advisor: Gustavo Rohde

- Received the Liang Ji-Dian Graduate Fellowship.

Dennis Trumble, PhD Candidate, BME: Advisor: Jim Antaki

- Received the 2009-2010 John and Claire Bertucci Graduate Fellowship, a CIT award for PhD students. This new CIT award recognizes academic excellence by engineering PhD students.

Samuel J. Hund, PhD Candidate, BME: Advisor: Jim Antaki

- Presented a platform presentation this summer at the Second Annual NIH/NSF/FDA Symposium on Computer Simulation for Design of Medical Devices in Washington DC. The title of his talk was "Multiscale modeling of thrombosis in assisted circulation."

BME Spotlight - Continued on page 8



Sasha Bakhru, PhD: *Technologies Enabling Autologous Neural Stem Cell-Based Therapies for Neurodegenerative Disease and Injury.* Advisor: Stefan Zappe

Chao-Min Cheng, PhD: *Understanding Cell-Based Bipolymer Structure Through Small-Scale Approaches.* Advisor: Phil LeDuc

Donghyun Lee, PhD: *In-Vitro Assessment of Phosphorylation Induced Biomineralization.* Advisor: Prashant Kumta

Warren Ruder, PhD: *Predicting in vivo Cell Behavior using Characterization and Analysis of*

Cellular Calcium Response. Advisors: Phil LeDuc and Jim Antaki.

Jane Valentine, PhD: *Modeling and Optimization of a MEMS Membrane-Based Acoustic Wave Biosensor.* Advisors: Todd Przybycien and Steinar Huaun

Justin Newberg, PhD: *Frameworks for Classifying Proteins across Human Cells Lines and Tissues.* Advisor: Robert Murphy,

Charles Jackson, PhD: *Model Building and Intelligent Acquisition of Fluorescence Microscope Data Sets.* Advisor: Jelena Kovacevic ♦



Important Dates & Events



BME Spotlight - Continued from page 7

Ender Finol, PhD, Associate Research Professor, Institute for Complex Engineering Systems, BME

- Received NIH funding for his research entitled "A Fluid-Structure Interaction Method for Patient-Specific Cardiovascular Modeling". A parent grant award and two subsequent supplement awards. For press release visit: http://www.sunherald.com/prnewswire/story/1602492.html?story_link=email_msg.

Judy Shum, PhD Candidate, BME: Advisor: Ender Finol

- Received an award at the Frontiers of Biomedical Imaging Science conference at Vanderbilt University as one of only four podium presenters for the Young Investigator's Forum. Her work entitled "Quantitative Assessment of Abdominal Aortic Aneurysm Shape and Rupture Potential."

Gail Siewiorek, PhD Candidate, BME: Advisor: Ender Finol

- Received the 2009-2010 John and Claire Bertucci Graduate Fellowship, a CIT award for PhD students.
- Published two journal manuscripts this year and a chapter entitled "Performance assessment and limitations of distal protection filters for carotid artery stenting" submitted for the book "Protective Devices: Types, Uses and Safety" was accepted for publication by Nova Science Publishers. ♦

Social Events

GBMES Lounge Party: Date: TBA; Location: Hamburg Hall A224. Graduate students can pick up keys from Brendan in Doherty 2100.

Professional Events

IEEE International Measurement University 2010: July 19-24, 2010. Learn skills in measurement science applicable to any type of measurement Visit: <http://imu.ieee-ims.org/>

Society of Biomaterials - 2010 Annual Meeting and Exposition: April 21-24th, 2010. Visit: <http://biomaterials.org>

Fund Science: A non profit which funds research. [www.http://fundscience.org/](http://www.fundscience.org/)

CIMIT External Funding Opportunity: Visit: <http://www.cimit.org/grants-external.html>

Presidential Management Fellows Program: For PhDs Interested in Public Policy. Visit: <https://www.pmf.opm.gov/>

(DMRDP) Applied Research and Advanced Technology Development Awards: https://cdmnp.org/files/2009/dmrpd/aratda_pa.pdf

Global Entrepreneurship Week: November 16th – 20th, 2009. Contact Amanda Fox: afox@andrew.cmu.edu. ♦