2010 Fellow Reports

Reports of the 2009-10 winners in Tau Beta Pi's 76th Fellowship Program are presented here. They constitute the Fellows' only specific obligation to the Association after their appointment by the Fellowship Board. Their reports were written in April, and the verb tenses may sound wrong when read later. Each of the winners expresses appreciation to advisors and major teachers, to family and helpful friends, and to the Association, donors, and the Fellowship Board for the honor of being named a Tau Beta Pi Fellow.

Of the 30 fellowships awarded a year ago, 17 of the students have been paid cash stipends totaling $165,000. One needed only a half stipend before securing funding. The other 13 did not need the stipend.

Eric V. Eason

Benjamin A. Baker

Stephanie E. Beckett

Eric V. Eason, CO B '09
Centennial Fellow No. 24

This past year was my first year of graduate school and was also the first year since my graduation from CU-Boulder in May 2009. In addition to the TBΠ Centennial Fellowship, I was awarded a Hertz fellowship and an NSF fellowship, and I eventually decided to attend Stanford University, where I was also awarded a Stanford graduate fellowship. I enrolled in the applied physics Ph.D. program beginning in the autumn quarter of 2009.

Having the fellowship support has enabled me to focus on my coursework during my first year, rather than be required to work to support myself. My interests are still broad, and I am not ready to decide what area of research to go into for my Ph.D. research, so I am taking advantage of TBΠ's generous support by taking a wide array of courses in different subjects, attending seminars and colloquia, and working with as many different research groups as possible.

During the winter quarter, I worked on a research project in the field of solid-state physics, which involved using an ionic-liquid gel electrolyte gate to control the electronic properties of thin-film lanthanum-doped strontium titanate semiconductors. I am now passing this project on to another physics graduate student as I search for a new project for the spring quarter.

Benjamin A. Baker, ID B '09
Fife Fellow No. 118

This past year, I have focused on completing my class requirements. The only component left for the master's degree is a thesis. I have started the preliminary stages of my thesis and plan to complete it this summer. After I finish the master's degree, I will continue to obtain a Ph.D. The thesis and the dissertation are an extension of my senior-design project. That project developed the equipment necessary to perform experiments, the master's thesis will determine key parameters of the ISU-AGN reactor necessary for kinetic equations, and the dissertation will determine if an open-loop oscillator system is just as accurate as the closed-loop system used in the French MINERVE reactor. If the project is successful, research reactors will be able to implement the system at a much lower price than the closed-oscillator system. After I have completed my schooling, I hope to work at a national laboratory. Thank you for the opportunity to be a TBΠ Fellow.

Stephanie E. Beckett, TX A '09
Fife Fellow No. 119

Since graduating from the University of Texas at Austin with degrees in aerospace engineering and Plan II, I have started my study of law at Harvard. So far in law school, I have been working to become increasingly involved in the *Journal of Law and Technology* (I am a line editor and a member of the submissions committee), and I have also been volunteering five hours a week during the spring semester to help low-income people file their income-tax returns. I am extremely excited to be starting my experience with the practice of law this summer at the regulations division of the Federal Aviation Administration's office of the chief counsel.

I do not know exactly where my career will lead me, although I am fairly certain I want to work for the federal government. The summer before law school, I passed a test to become a registered patent agent, so I may be interested in a career involving patent law. In addition, though, I am really enjoying my tax law class (surprisingly). So, with the help of the TBΠ Fellowship, I have been exploring as many areas of the law as possible during my first year of law school.

Brian D. Carlton, WA B '09
Fife Fellow No. 120

This past year I have been working on a master's degree in geotechnical engineering at UC, Berkeley. The program lasts only one year but is very intense. In the fall I completed courses in advanced soil mechanics, earthquake engineering, engineering geology, and groundwater hydrology. I was also a teaching assistant for the undergraduate introduction to geotechnical engineering class. This spring I am taking an advanced lab course, advanced foundations, environmental geotechnics, seismology, and French I. In addition to coursework, I have been active in the very first student chapter of the Deep Foundation Institute, which was started on campus last August. We hosted a symposium with seven speakers from all around the world.

I hope to graduate in May with my master's and then begin work on a Ph.D. I will be working with Professor Juan Pestana of the university's geotechnical group. Our research will examine how to better characterize and codify the response of soft clays to strong ground motions with numerical modeling. After that, I would like to travel and work abroad.


Brian D. Carlton


Brandon L. Eidson


Arash Farhang


Joshua J. Hammell


Christine E. Holl


Towa Matsumura

Brandon L. Eidson, AL A '08
Fife Fellow No. 121

After getting married last summer, I resumed my graduate studies at Auburn University. During the past semesters, I have been attempting to implement a digital compensator based off the delta-operator. I have chosen a DC-DC converter as my test plant and a phase-boost compensator as my controller. I recently completed the mathematical derivation of the phase-boost compensator such that it can be implemented using delta-operator logic. I will compare this approach to the traditional shift-operator implementation.

I will have completed my course requirements at the end of this semester and am on track to graduate with my master of science in August 2010. My wife and I are planning to move to England where I will be expanding my education into fields of philosophy and theology at Oxford University in September. Upon completion of this program, I am planning to pursue doctoral work.

Arash Farhang, UT A '09
Fife Fellow No. 122

Arash was set to embark upon a Ph.D. in the field of photonics at the University of Utah where he had completed his B.S.E.E. during the summer of 2009. Just before graduating, however, he was accepted into the prestigious *Ecole Polytechnic Federal Lausanne* (Swiss Federal Institute of Technology Lausanne) and soon after was offered a position as a Ph.D. student in the nanophotonics and metrology laboratory of Professor Olivier Martin. The lab's main focus of research within nanophotonics is the new and exciting field of plasmonics. Plasmonics, the optics of metallic nanostructures, shows great promise in destroying cancerous tissues without harming other cells, improving the resolution of microscopes, improving the sensitivity of biological sensors, and providing a means to compute at optical speeds while still retaining the compactness of a modern IC.

Until December 2009 when he was officially enrolled as a Ph.D. student, Arash focused mainly on courses in optics at EPFL. His topic of study is compound plasmonic structures, structures that support both localized and propagating plasmons, the former being confined around nanoparticles and the latter to thin films or arrays of particles. The aim of the project is to model, fabricate, and characterize such new structures not only at EPFL, but also at the IISER Mohali in India through collaboration with another Ph.D. student. Since December, he has been working on a setup for characterization and has been creating simulations in order to better understand this new and mysterious field.

Joshua J. Hammell, SD A '09
Fife Fellow No. 123

After becoming a ΤΒΠ Fellow, I enrolled in full-time graduate study at South Dakota School of Mines and Technology, seeking a master of science in mechanical engineering. As a graduate research assistant, I have been conducting research in two main areas of laser additive manufacturing. First, under guidance of Dr. James Sears, I am one of the laser-system operators in the additive manufacturing laboratory at SDSM&T. As a system operator, I have been working to develop laser-processing technology in the following areas: internal laser cladding of long cylindrical bores, laser brazing of copper alloys, and crack repair of dies. Second, under guidance of Dr. Michael Langerman, I have been working to characterize bulk-part and melt-pool temperature profiles observed during laser-material processing. This includes real-time measurement of temperature by thermal imaging and multi-wavelength pyrometry.

After completing an M.S., I plan to continue my studies in thermal science and laser processing. To do so, I plan either to pursue a Ph.D. or conduct laser-processing research in an industrial setting.

Christine E. Holl, E.I., CA Λ '09
Fife Fellow No. 124

Since I started at the University of California, Berkeley, I have been taking classes and focusing on deciding with whom I want to work and what I want to study for my M.S. and Ph.D. I have decided to major in heat transfer within the energy science and technology field in mechanical engineering, and my minors will most likely be fluid dynamics and material science. After taking a phase-change class taught by Professor Van Carey, I decided to work with him as my research advisor. I began meeting with him and started background research to understand the different fields in which he has particular interest. While he has been guiding me and helping me pick classes, he has also been sharing with me his past research work and what his students are currently doing. We have begun work on a project that I will use for my M.S. thesis that involves creating simulation models for four different water heaters in a new program Modelica. I will be collaborating with Lawrence Berkeley National Lab in order to get the experimental data and compare to my simulation model analyses.

Towa Matsumura, MA A '09
Fife Fellow No. 125

I spent the majority of the past year fabricating an acoustic phantom of the carotid artery that I needed to run experiments for my thesis research in medical ultrasound. It took more time than I had originally budgeted due to unforeseen problems in the fabrication method. Simultaneously, I tested various aspects of the ultrasound scanner our lab owns to accurately characterize the system outputs and its variable dependency. This was necessary in order to optimize the scanning parameters when running the experiment. Sets of data were obtained in the past two months, and I am currently adjusting my previous algorithm to obtain better results.

This past year has significantly changed my course of life. Thanks to the stipend, I was able to spend more time studying acoustic physics and medical ultrasound for my thesis research, and, as I advanced in knowledge and experience, my appreciation for the field of medical ultrasound grew. I had to postpone my plans for obtaining a Ph.D. due to a change in family circumstances. However, I am happy that I will be able to continue my involvement in medical ultrasound at Philips Healthcare R&D as an ultrasound system design engineer upon graduation.

I am very grateful for the opportunity that the ΤΒΠ Fellowship has given me. It made it possible for me to pursue a M.S., and this has awakened in me a new passion in a field that has the potential for affecting many lives.


Sarah E. Ott


D. Cody Rice


Christopher W. Stivers


Brady N. Wiesner


Samuel F. Wight


Richard L. Winslow

Sarah E. Ott, IN Δ '09
Fife Fellow No. 126

This year, as a graduate student at North Carolina State University, I worked with a research team on a state department-of-transportation-funded project to evaluate the operational and safety impacts of superstreets. These are an unconventional arterial intersection design that restricts minor road through and left-turn movements. These movements are instead made by a right-turn onto the major road followed by a U-turn. Through the project, I helped conduct survey studies to determine the perceived advantages and disadvantages of a superstreet. Surveys were given to motorists and business owners/managers to gain their perceptions of safety and operations of a superstreet. I have also analyzed the safety of superstreets over the last year and will continue to do so for the remainder of the project. The safety analysis will include a naïve analysis and comparison-group method analysis of signalized and non-signalized superstreets. I will also conduct an Empirical Bayes analysis on unsignalized superstreets to account for regression to the mean. After graduation, I hope to continue impacting the safety of America's roadways and become a proponent for superstreets in my region.

D. Cody Rice, CO A '09
Fife Fellow No. 127

My research at Purdue University is in the field of aerodynamics, as I am continuing to develop temperature-sensitive paint to be used in wind-tunnel testing. By using this paint, the tunnel researchers obtain visual, immediate results for the temperature distribution on a model, which allows heat transfer analysis, CFD validation, and better flow understanding. Currently, we are developing paint to be utilized in the Boeing Mach 6 quiet wind tunnel on campus. The paint allows the researchers using the Mach 6 tunnel to visualize points of transition from laminar to turbulent flow as the turbulent flows have greater heat-transfer rates than the corresponding laminar flows. This has greatly helped our researchers examine transition and transition methods at high Mach numbers.

Christopher W. Stivers, MA E '09
Fife Fellow No. 128

A year from now, when I finish my master's degree, I hope to join a start-up medical-device company, where I can gain additional skills and experience that will help my goal of someday starting a company of my own in the medical-device field. My first year at Stanford University has provided many experiences to help prepare me for this future career. In the mechanical engineering department, I have chosen to pursue a concentration in design. My courses use individual and group projects to teach the design process so that I may better assess customer needs, then design and create higher quality products. I am also reaching beyond M.E. to take courses in management science & engineering to learn more about entrepreneurship and management. As part of my responsibilities for my teaching assistantship appointment in the biodesign program, I have been helping students with medical-device-related projects. I also create and teach workshops in design, prototyping, and manufacturing methods (i.e., milling machine and lathe). Equally important to my academic activities, however, are the great life experiences I have been enjoying since moving here. I have sampled many of the Bay Area's wealth of outdoor offerings, traveled to Colombia for a course project, and joined the graduate rugby team. My first year here has been full of great experiences that not only support my future career plans, but that also let me try new things and allow for personal growth.

Brady N. Wiesner, SD A '09
Fife Fellow No. 129

I greatly appreciate the generous support of TBΠ and its donors who have made my educational goals reality. In this last academic year, I have been working to earn a master's in civil engineering from the South Dakota School of Mines & Technology. I've been actively advising, inducting, and leading the South Dakota Alpha Chapter. I traveled to the TBΠ Convention in New Jersey and the District 12 Spring Conference in Laramie, WY. Last fall was academically rewarding with a start in finite-element analysis and material and building dynamics. Transportation analysis and structural design were accompanied with my research project in the spring. Mr. Hansen, Dr. Fazio, and Dr. Boysen are the advisors of this project, which has transformed from a concept of tensile strength in concrete to a directly measurable characteristic. Tensile strength is now obtainable from this newly developed testing method. Concrete mixes with various water-cement ratios have been tested and have produced very promising results. The results have been correlated to existing methods which indirectly approximate tensile strength. The summer will be spent working at the Puget Sound Naval Shipyard and writing my thesis. This coming fall will be the last semester for completing my master's and coursework. It will emphasize statistical analysis and construction management leading to full-time employment as a nuclear facilities engineer. Thank you TBΠ for your support of me and I give special thanks to Dr. Larry A. Simonson, our chapter advisor, for encouraging me to apply for this fellowship.

Samuel F. Wight, MO Γ '09
Fife Fellow No. 130

This year, Sam continued his research project with the NASA reduced-gravity flight program to study lunar-dust mitigation on solar panels, and he and his team will be flying on the "Weightless Wonder" aircraft in April. Their tests will study the effectiveness of vibration levels on dust removal in simulated lunar gravity. He has also continued to work with the Washington University center for innovation in neuroscience and technology, where the neurosurgical device he invented jointly with a group of surgeons and engineering students will be entering animal testing this summer. Designed to allow non-invasive measurement of the intracranial pressure of a patient, the device could help reduce unnecessary hospitalization and surgery for people with hydrocephalus. Sam will graduate from Washington University in St. Louis in May with his master's in dynamics and mechanical design as an engineering valedictorian. Then he will be pursuing his interest in space by working for SpaceX as a structural engineer on the *Dragon* space capsule.

Richard L. Winslow, FL A '09
Spencer Fellow No. 54

During the first year of my graduate studies at the University of California, Berkeley, I began a project to study and control the growth of nanostructures by using lasers as a local heating source. I have been working with Professors Liwei Lin and Costas Grigoropoulos to build apparatuses, conduct experiments, and perform analyses on methods that could open many doors to high-resolution, three-dimensional nanostructures. I presented my preliminary findings with a poster at the IAB conference on the campus. Last month, I began volunteering my time to help a fellow mechanical engineering graduate student launch Race4Awareness, a nonprofit organization aimed to affect the public consciousness positively about various causes. Currently the organization is focusing on increasing awareness of celiac disease and proving how cool engineering can be. I plan on continuing schooling to receive my Ph.D. in mechanical engineering. During the summer months, I would like to volunteer my time abroad to help small communities through engineering nonprofits.

Zachary H. Bugg, MS A '09
King Fellow No. 48

Since enrolling at North Carolina State University, I have been working on NCHRP 3-98: "Guidelines for the Use of Auxiliary Through Lanes (ATLs) at Signalized Intersections" under professors Nagui Rouphail and Joseph Hummer. An ATL is essentially an extra lane for through traffic added before a traffic signal that ends in a merge beyond the signal. Since most arterial congestion occurs at intersections, ATLs are a cost-efficient spot improvement when compared to conventional widening over an entire corridor. ATL's have been shown to be underused, and I have been working on a statistical model to predict their use. I am also examining the safety effects of ATLs using a simulation model calibrated with field data, including downstream merge behavior and location, queue length, acceleration rate, and travel time. Upon publication, I hope the results of this study will benefit practitioners by allowing them to predict the operational and safety effects of an ATL before they implement one. Although I was accepted in an M.S. program here, I have since transferred to the Ph.D. program in anticipation of my career plans, which will involve traffic-engineering research at a university or private engineering firm. After my current NCHRP project ends, I plan to examine ATL use on a microscopic level and use queuing behavior to develop a more in-depth model.

Robert P. Schroeder, IN Δ '09
Sigma Tau Fellow No. 36

The past two semesters mark the beginning of my graduate study at Penn State University. I am focusing on the thermal-fluid sciences because my main interest is in energy conversion and power machinery. During the first two semesters I took fundamental courses in fluids. I also made an early start to my research in August 2009 by joining Professor Karen Thole's research group, the experimental and computational convection lab. One of our main focuses is convective film cooling in gas turbines. My research will be an experimental study of different film cooling hole geometries, where I will use a wind tunnel to test scaled-up models of each geometry. An exciting aspect of the research is that for the first time our lab will be able to match engine-realistic values of the "coolant-to-mainstream" density ratio, a non-dimensional parameter that is rarely matched in experiments. Matching the density ratio required us to build a new wind tunnel and coolant system, and this build-up comprised the majority of my research work this past year. The wind tunnel will be running this summer.

Film-cooling studies like mine allow gas-turbine designers to use less coolant air to cool the same turbine components. This in turn allows the engines to operate at higher temperatures and be more efficient. After graduate school, I hope to work in a technical position and continue advancing the state-of-the-art in power machinery. I am grateful for the fellowship support from ΤΒΠ. Thank you for this honor.

Zachary H. Bugg

Robert P. Schroeder

Kristin M. Busa

Kristin M. Busa, NY B '09
Stark Fellow No. 32

As my first year of graduate school comes to a close, I take this time to reflect on all that I have accomplished and learned. I have settled into a new region of the country, made new friends, and have begun working toward my Ph.D. at the University of Virginia.

In the past year, I have taken six graduate courses focused in thermofluids, expanding my knowledge in areas like fluid mechanics, classical and quantum thermodynamics, and hypersonic airbreathing propulsion. These courses complement my research at the university's aerospace research lab. In the past year, I have become familiar with the experiment I will be working on: the development of a tunable-diode laser-absorption tomography technique. In addition to learning the theory behind this diagnostic tool, I have collected actual data sets using the existing system. I have begun making substantial upgrades to the system by increasing its robustness and incorporating more high-performance components. I have also selected new regions of the infrared spectrum to investigate and probe with our diode lasers.

My studies here are helping me work toward my goal of becoming a professor. The ΤΒΠ Fellowship has allowed me to focus on refining my research capabilities while expanding my knowledge of thermofluids.

Arthur H. Chang, CA B '09
Williams Fellow No. 30

Since receiving the ΤΒΠ Fellowship, I have graduated with honors from the California Institute of Technology with a B.S.E.E. Last summer, I immediately started research as a graduate research assistant with the Caltech high-speed integrated circuits (CHIC) group under the guidance of Prof. Ali Hajimiri. Specifically, I have built several different types of test structures in the IBM 45nm SOI CMOS process, designed and simulated sub-terahertz cross-coupled oscillators, and characterized and modeled on-chip transmission lines for power-amplifier design.

Last fall, I started working toward my M.S. in electrical engineering here. While taking courses, I have continued doing research in the CHIC group under DARPA's HEALICs program. The goal of the project is to develop techniques to maximize the number of fully operational mixed-signal systems-on-a-chip on an individual wafer that meet all performance goals in the presence of extreme process variations and environmental conditions. Much of my effort has been spent on designing a successive-approximation register analog-to-digital converter to sample data from various embedded sensors to monitor the circuit performance in real-time.

Upon receiving my M.S. in June 2010, I will continue my studies in the E.E.C.S. Ph.D. program at M.I.T. Upon graduating with a Ph.D., I wish to pursue both teaching and research by becoming a professor. I am grateful for the privilege of being a ΤΒΠ Fellow and will continue to contribute to *Integrity and Excellence in Engineering*.

Arthur H. Chang

Jerry A. Bradley Jr.

Uche D. Monu

Tal Rusak

Christopher M. Potts

Gregory R. Lehnhoff

Jerry A. Bradley Jr., AL E '09
Deuchler Fellow No. 30

I am a first-year medical student at the University of Alabama at Birmingham. So far, I have joined a community-outreach program where we screen for hypertension and diabetes. I have started writing and distributing a monthly newsletter about the signs and symptoms of common illnesses and have helped in a community weight-loss challenge to fight obesity in which several members have already lost 5 -10 percent of their body fat. Through our efforts we have aided many people in making the lifestyle changes necessary to be healthy and productive by focusing on early prevention of common major risk factors.

I will also undertake a research project over the summer in cardiology. Recent studies have suggested that glucose metabolism is an integral circadian-clock component. It has also been found that the circadian clock within the cardiomyocyte regulates the enzyme O-GlcNAc transferase (OGT) in a time-of-day-dependent manner. This enzyme plays a critical role in reversible O-GlcNAcylation of target proteins on Ser/Thr. This in turn leads to time-of-day dependent oscillations in protein O-GlcNAcylation in the heart. The goal of the project is to investigate whether O-GlcNAcylation in turn influences the circadian clock, thus identifying a new feedback loop in which metabolism and the clock intersect.

I am very grateful to ΤΒΠ for its investment into my future. It is with the sincerest gratitude and heartfelt appreciation that I extend my most humble thanks for your generosity and support.

Uchechukwuka D. Monu, DC A '09
Matthews Fellow No. 12

Since starting my graduate degree at Stanford University, my goal has been to lay a solid foundation in the field of medical imaging and signal processing. This first year has been spent acquiring knowledge in the areas of adaptive signal processing, digital signal processing, neural networks, ultrasound, and MRI. I have been fortunate enough to have toured the medical facilities here and seen the fascinating projects that have combined engineering and medicine. The four projects that I was exposed to during my first year were in the areas of sleep apnea, MRI, rapid eye movement, and pneumonia detection. I shall be working on implementing adaptive-signal-processing techniques to help with the detection of pneumonia in kids under the age of five. Working in industry has informed me, apart from pursuing the core skills necessary to tackle engineering and medical problems that pervade our society today, of the great importance of understanding not only the technical but the business side of your profession. As a result, in addition to taking the courses above, I have invested my time in management, accounting, and entrepreneurship classes. These will add to my core skill set and make me a more competitive and rounded professional in industry. After receiving my M.S. in electrical engineering next year, I hope to pursue my doctoral degree in the area of biomedical imaging. I thank ΤΒΠ for giving me the opportunity to represent the organization as a ΤΒΠ Fellow. Thank you.

Tal Rusak, NY Δ '09
Nagel Fellow No. 12

As a graduate student in the computer science department at Stanford University, Tal conducted research into the time-scale variations in the characteristics of low-power, unlicensed-band wireless networks. His key observation was that many such networks have reception characteristics that follow a rigorous statistical property known as self-similarity, which suggests burstiness at time ranges spanning orders of magnitude. The work concluded that self-similarity is pervasive over a range of diverse test-beds and at different times and can be correlated with human presence and activities. His research continues in investigating transformative concepts in computer systems and networking.

He also pursued advanced coursework in a number of areas. He served as a reviewer for the *Sensors* journal and volunteered to introduce prospective graduate students to his department.

His studies are funded by a national defense science and engineering fellowship from the Air Force's office of scientific research and an NSF graduate research fellowship.

Christopher M. Potts, NY M '09
Anderson Fellow No. 5

I am enrolled as a first-year student in the Ph.D. program in the department of electrical and computer engineering at the Pratt school of engineering at Duke University in Durham, NC. My area of study is signal processing and communications. I plan to continue my research under the supervision of my advisor in the summer of 2010 and also to continue in the Ph.D. program here.

My research began by interfacing a simultaneous localization and mapping (SLAM) algorithm with a mobile robot equipped with an acoustic array and laser rangefinder. The algorithm created a 2-D map of the environment by exploiting the robot's maneuverability and the laser rangefinder data, while the array collected data from a stationary sound source. The map was then employed to distinguish between the direct path and the multipath of the environment in order to localize the sound source. I then researched the applications of SLAM on AUVs in order to map the underwater environment, as well as to localize the vehicle without having to surface and update its position via GPS.

My current research focuses on underwater acoustics, specifically bi-static-delay Doppler acoustic imaging of odontocete prey-fields. The animal will be "tagged" with a hydrophone, which will be insonified by a tracking shipboard echo-sounder. The tag will record the direct path transmission from the ship, as well as the bi-static volume scattered transmission. I will then image the biomass distribution of the prey-field immediately surrounding the moving underwater receiver through use of a differential-delay Doppler scattering function.

Gregory R. Lehnhoff, CO A '09
Hanley Fellow No. 5

My first year as a graduate student at the Colorado School of Mines has been exciting and fulfilling. At the end of this semester, I will be more than half way done with the coursework required for my Ph.D. program. I have also been active in my department as a teaching assistant, where I have helped operate undergraduate labs in foundry metallurgy and microstructural development of materials.


Indraneel Sircar


Derek J. Woodman


Benjamin G. Freedman


Dane A. Grismer


Andrew J. Jones


William C. Selby

I have also identified my Ph.D. thesis topic and conducted an initial literature review. The aim of my thesis will be to characterize and model damage evolution in advanced high-strength steels (AHSS). These steels are candidate materials for a variety of applications in the automotive industry, where their high strength and good formability allow the use of thinner structural sections, thus, reducing vehicle weight and improving fuel efficiency. Specific areas of interest within this topic include the fatigue response of metastable retained austenite and the role of phase boundaries in contributing to damage in AHSS. Characterization will involve a combination of mechanical testing, diffraction experiments, and electron microscopy.

I am extremely thankful for the support ΤΒΠ has offered through the Fellowship Program. I look forward to upholding the values, principles, and excellence of this Society and am excited to continue my involvement with my local chapter during the next three years.

Indraneel Sircar, MA A '09
Arm Fellow No. 2

In August 2009, I became a graduate student pursuing a direct Ph.D. within Purdue University's mechanical engineering faculty. Advised by Dr. Jay Gore, I am a member of a research team at the Maurice J. Zucrow Laboratories trying to understand the chemical kinetics of coal gasification. The last semester, the team and I developed the design for a lab-scale optically accessible coal gasification system operating at high pressures and temperatures. In the current semester, we are assembling the system and preparing for experimentation. My interests lie in the field of experimental combustion and alternative energy sources, and I plan to continue studying coal gasification during the following years.

In fall 2010, I have to appear for the mechanical engineering department's area examinations. Following those, I will identify a thesis topic overlapping the areas of combustion and optical diagnostics. Though far away, my career plans include post-doctoral research into alternative energy sources immediately after my Ph.D. Besides research, I also have an interest in teaching and am going to accommodate a teaching assistantship in the latter years of my Ph.D. Ultimately, I hope that my background will make me ready to pursue a faculty position and conduct research combining the fields of combustion, optical diagnostics, and alternative energy.

I thank Tau Beta Pi for choosing me as a ΤΒΠ Fellow and assisting me throughout my education in past years.

Derek J. Woodman, KS Γ '09
Lynnworth Fellow No. 2

I have mainly used my fellowship funds to pay rent this past year. Paying for a place to live in the Phoenix metropolitan area has proved to be quite expensive. With this burden removed, I was able to focus on my studies and research; otherwise, I would have had to pick up a part-time job or take out a student loan. Because of the ΤΒΠ Fellowship, I have been able to maintain a 4.0 G.P.A. in courses and to get a jump-start on my graduate research without increasing my financial debt. Now with a firm foothold on graduate school, I am confident I will be able to receive my doctorate without any doubt. Thank you ΤΒΠ and all of those who contribute their time to such a great organization!

Benjamin G. Freedman, ME A '09
Tau Beta Pi Fellow No. 768

I am in my first year of graduate studies in chemical engineering at Stanford University. Most of my year has been spent on completing the required coursework and rotating in different labs to pick a research area and an advisor with whom I would like to work. I recently passed my first qualifying exams and have started my doctoral research under the guidance of Professor Alex Dunn in the field of single-molecule studies.

My doctoral studies will take me about four years, and in this time I plan to work on different projects. At the same time I would also take various classes, not only to enhance my knowledge in my research area, but also to give myself exposure to other different fields. While working in the lab I would also be mentoring new students, so as to pass on my knowledge to them and to enhance my own understanding of the field.

After graduating I plan to work in industry, possibly for a pharmaceutical company, and give myself an exposure to a field different than academia. After gaining industrial knowledge, I should be in a better position to decide whether to stay in industry or go back to academe. I look forward to four fruitful years.

Dane A. Grismer, NC A '09
Tau Beta Pi Fellow No. 769

The past year has been a busy one in South Bend. I was chosen as a recipient of a Notebaert premier fellowship, one of the top awards offered by the University of Notre Dame. Beyond completing core graduate coursework in chemical and biomolecular engineering, I have begun my research in the area of nanofluidics. Working with Dr. Paul Bohn, I am exploring the fundamentals of single-particle detection in cylindrical nanopores; as reaction vessels, these are ideal structures to study the effects of confinement and crowding on macromolecular reactions. I will be modeling reactions in horizontally-aligned cylindrical nanocapillaries with plug-flow tubular reactor kinetics, using a microscope that I am assembling to measure key fluid-flow properties of single molecules and how reactants interact with surface-bound reaction partners on nanocapillary walls.

When I complete my Ph.D., I plan to work in product development at a national lab or in industry. I am particularly interested in the possibilities opened by mass production of lab-on-a-chip technology to aid in the creation of various nanofluidic devices that can selectively remove pollutants, improve fuel cell efficiency, or detect important biomarkers before diseases occur. Nanotechnology is enabling fundamental discoveries that are applicable to a wide range of end products and processes.

Moving beyond the classroom and the lab, I am working with Dr. Peter Kilpatrick, dean of engineering, on an initiative to build a strong community of Catholic faithful within the college, particularly in the graduate program.

Andrew J. Jones, MN A '09
Tau Beta Pi Fellow No. 770

Last year I began my studies toward a Ph.D. in chemical engineering at the University of California, Berkeley. My research interests led me to the Iglesia group where I have begun studying solid acid catalysis. My project entitled "Structural and Site Requirements in Shape-Selective Hydrogen Transfer Catalysis" has led me to explore the reactivity of different sites inside zeolites. I have completed building a reaction unit to study these effects in flow, pulse, and transient modes. I am excited to continue this research in the coming years.

William C. Selby, MD Γ '09
Tau Beta Pi Fellow No. 771

I am currently in the distributed robotics laboratory in the computer science and artificial intelligence laboratory at MIT. I am being advised by Professor Daniela Rus and am pursing a master of science in mechanical engineering. My research is a combination of computer vision and robotics. We would like to be able to autonomously track ground targets, specifically whales on the ocean surface, using cameras on aerial vehicles. I have created a computer-vision algorithm that allows the user to segment an image based on hue and saturation values to identify the intended target and follow that target in subsequent frames. The location of the target in the image is then used to control the aerial vehicle's position to keep the target in the image frame. This has worked reliably in an indoor environment, and I am now preparing the system for field trials outdoors.

After completing my program here, I will continue my duties in the United States Marine Corps. I will be stationed at Quantico, VA, for the basic school. I wish to become an intelligence officer and continue to serve in the corps. I hope to use my graduate education effectively, possibly working at the Marine Corps warfighting league or teaching future officers at the United States Naval Academy.

Send THE BENT to Me

(Detach and mail to: Tau Beta Pi, P.O. Box 2697, Knoxville, TN 37901-2697. Allow four-to-six weeks for subscription to take effect.)

☐ I enclose $60, for which I shall expect to receive THE BENT for life. I will keep you informed of any change of address.

☐ I enclose $12.50 as the first payment for a BENT Life Subscription. Remind me to send $12.50 each year for the next four years.

☐ I enclose $10, which will keep me on the mailing list of THE BENT for one year. I should appreciate an expiration notice a year from date, so that I may renew without missing any issues.

Name _____ Chapter _____ Class _____

Address _____

City _____ State Zip _____