

From the Director

Dear Reader:

Concurrent with this issue of the CBST Newsletter, we are preparing for our Renewal Site Visit by the National Science Foundation (NSF). This is important since it will lead to NSF approving our 2nd five-year funding cycle as an official NSF Science & Technology Center.

We are also accelerating efforts for post-NSF funding through business development and public-private partnerships. We'll share our efforts in future CBST Newsletters. Please enjoy reading about the Center's programs and events in this issue.

Sincerely,

*Dennis L. Matthews,
Director*

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Center Celebrates Grand Opening -- \$20 million Oak Park Research Building

The National Science Foundation's Director of Integrative Activities, Dr. Nathaniel Pitts joined Center Director Matthews and Co-Director Boggan in celebrating the grand opening of the Center's new "world headquarters" helped formally open the Center's new facilities on January 30, 2006. Known to many as CBST, the center is a hub for over 100 investigators at nine institutions across the United States involved in the study of light in biology and medicine – Biophotonics. Dr. Pitts addressed a large crowd of public leaders, University administrators, and invited guests and applauded the efforts of the University and the Center's leadership in making this facility a reality. "This state-of-the-art facility makes UC Davis the world headquarters for biophotonics, one of the most exciting disciplines in biotechnology. The discoveries and technologies developed here will revolutionize biology and medicine," said Nathaniel G. Pitts, director of integrative activities for the National Science Foundation.

The Oak Park Research Building cost \$20 million, provides 40,000-square-foot of administrative and high-level research space, and occupies a former empty lot adjacent to the UC Davis medical Center. Although CBST is the largest occupant, using nearly 13,000 square feet, the two-story brick, stucco and glass building also houses the UC Davis Center for Healthy Aging and UC Davis infectious disease and cancer research laboratories. "The opening of the Oak Park Research Building is important not just for UC Davis but for everyone in our region," said Claire Pomeroy, vice chancellor for human health sciences at UC Davis and dean of the UC Davis School of Medicine. "This beautiful new building contributes to the renaissance of Oak Park, boosts Sacramento's reputation as a growing biotechnology hub and makes possible tremendously exciting work in infectious

diseases, cancer and biophotonics – work we will share through an ambitious technology transfer effort and innovative educational programs aimed at inspiring a new, more diverse generation of scientists."



Director Matthews (C) and Co-Director Boggan (L), shown with Pitts (R), Director of Integrative Activities, National Science

Established in 2002 with a \$40 million NSF grant, CBST is the only NSF funded science and technology center totally devoted to the field of Biophotonics. Participating research and education institutions – UC Davis (lead institution), Lawrence Livermore National Laboratory, UC Berkeley, UCSF, Stanford University, Mills College in Oakland, Alabama A&M University in Normal, Ala., the University of Texas at San Antonio, and Fisk University in Nashville, Tenn. – contributed \$12 million in matching funds. Other collaborating research institutions include Lawrence Berkeley National Laboratory, UCLA, the University of Toronto, and the Canadian Institute for Photonic Innovations at Université Laval in Quebec, Canada, and National Yang-Ming University in Taipei. "NSF Science and Technology Centers spark research, technology development, education and industry all around them. CBST is helping to put UC Davis and the Sacramento area on the map as an important biotech and research zone," said Dennis Matthews, CBST director and an expert on applying lasers and optics to medicine. *Continued on page 2.*

Grand Opening, *Continued from Page 1*

“The biophotonics field has far-reaching applications for medicine, from non-invasively diagnosing cancer to answering fundamental questions about how disease develops at the molecular level,” said James Boggan CBST co-director and professor and vice chair of neurological surgery at UC Davis. The center has also developed new undergraduate and graduate courses, undergraduate research internships, public demonstrations of biophotonics technology, innovative outreach programs for minorities and women, and a program in which undergraduate and graduate students mentor high school students in science. About 60 students from Sacramento High School in Oak Park and Center High School participated in the building grand opening and toured CBST.



Dr. Natt Pitts talking to students at the Grand Opening

“Now that we’ve moved in, we look forward to engaging many more students,” said Marco Molinaro, CBST chief education officer. “We want to spark an interest in science among children and young adults, and we want to ensure that tomorrow’s science and technology leaders reflect the diversity of our population.” In addition to CBST, the Oak Park Research Building houses several other UC Davis Health System research laboratories.



Students and VIP guests discuss Biophotonics at the Center’s educational laboratory

The largest belongs to Kit Lam, MD, PhD, Professor and Chief of Hematology and Oncology at UC Davis Cancer Center. Lam, a leading expert on combinatorial chemistry and drug development is working on novel therapeutic and imaging agents for lymphoma, leukemia and ovarian cancer.

Science Fair Winners!

Center High School CBST Research Teams win first and second place in the Senior Team Science division of the Sacramento Regional Science and Engineering Fair. On Saturday, March 18 at Cal Expo, two Center High School science research teams stood at attention by their posters, lab notebooks, and research papers and fielded challenging questions from a host of judges at the Sacramento Regional Science and Engineering Fair. The participating students from Center High School in Antelope are in their second year of the CBST-sponsored after school program, the High School Research Academy in Biophotonics, under the thoughtful mentorship of teacher-advisor Michael (Mike) Wright. Their investment in and ownership of the projects paid off – they won first and second place in the Senior Team Science category! First place went to the project, "Retarding the Growth of Escherichia coli with Varying Light Wavelengths" by Anna Vasilchenko (left in photo below), Angelique Moore (center), and Ziyeda Sidikov (right). Their study investigated the impact of different wavelengths of light on bacterial growth (E.coli) with some surprising results! Second place was awarded to Crystal Charity (left in photo at far right), Nikita Singh (right), and Ashley Rubin (not shown) for their project, "Mice and their Reaction to Light" which exposed mice to varying light conditions and measured their efficiency in running a maze under those conditions. Implications for their study reach into any behavioral studies done with mice!

Pam Castori, PhD, a member of the Center’s Education Team attended the formal judging and shared her excitement at a recent meeting of the Education Review Committee. She said, “I am very impressed with these students and am convinced that continuing to engage and excite kids like these - curious, interested, and committed - should remain a top priority for CBST. The program is making a significant difference in their knowledge about the enterprise of science and in their perspectives on what role science can play in their lives, including college and careers. Let’s hear it for CBST Team Science.”



Congresswoman Doris Matsui tours CBST

Congresswoman Doris Matsui (CA-5) visited CBST earlier this year and learned about the field of Biophotonics and the Center's research, education, and knowledge transfer programs first-hand. A strong advocate for ensuring our nation's global competitiveness, the Congresswoman was recently named to the House Science Committee.

According to the press release, issued Thursday, May 4, 2006 by her office, "with this assignment, in addition to her seat on the Rules Committee, the Congresswoman will support efforts to ensure a sound policy in making certain the US's continued preeminence in scientific research, and reinvigorating math, science and engineering education to produce the next generation of scientists." She also stated in this article that she was "awed by the cutting-edge research being done at the [recently opened] Biophotonics Center." The complete news release can be read at: <http://matsui.house.gov/Newsroom.asp?ARTICLE2939=6381>



Congresswoman Matsui pictured with students from Center High School

Upcoming Events

... *Got Biophotonics???* CBST Launches 2006 Summer Research Academies for Teachers

This summer, teachers will once again become students in a new and unique academy designed especially for teachers - **The Biophotonics Research Academy for Teachers**. In partnership with the Edward Teller Education Center (ETEC), the Center's Education Program will conduct FREE workshops teaching teachers about the physics and biological concepts behind biophotonics, participate in hands-on inquiry activities, and tour CBST labs (see photo of CBST laboratory, Oak Park Research Building) where biophotonics research is underway. Designed as a standards and inquire-based Workshop, teachers will also leave with lessons and materials for direct use in their classrooms. High School Kits with materials and equipment are also available to participants for checkout. According to Marco Molinaro, PhD, Chief Education Officer, "teachers should expect a rigorous, exciting and fun experience learning about the world of Biophotonics. He also hopes that all teachers will leave the workshop with a set of new teaching tools that are relevant and cutting edge and can be used back in the classroom." Dr. Molinaro hopes to attract teachers from a number of disciplines – especially those that have strong linkage to the field of Biophotonics – such as Biology, Life and Health Sciences, Physics, Physical Science, and Biotechnology. For more information, please eMail Pam Castori, PhD @ pscastori@ucdavis.edu or to register visit <http://education.llnl.gov/>

Other Key Events for 2006:

Annual CBST Meetings:

- Education Program Review Committee: March 17
- Board of Directors Meeting: May 2
- Science Program Review Committee: May 15
- External Advisory Board Meeting: May 16-17

- Future Faire: May 17
- NSF Renewal Site Visit: May 31-June 1
- CBST Annual Retreat: July 10-12

Additional information on Center events can be found at: <http://cbst.ucdavis.edu/events>

Center Welcomes New Faculty

The NSF Center for Biophotonics Science & Technology welcomes **Thomas Huser, PhD** to the faculty of the Department of Internal Medicine, School of Medicine, University of California, Davis. Dr. Huser's research interests and expertise are centered around ultra-sensitive laser spectroscopy of molecular and biomolecular systems. In particular, he is interested in elucidating complex biological pathways at the level of single cells. In order to gain insights into the chemistry of cells at this level of sensitivity and specificity he employs nano-biophotonics tools, such as single molecule fluorescence detection, and novel intracellular nanosensors. He also uses Raman spectroscopy and coherent anti-Stokes Raman microscopy to non-destructively analyze the biochemical state of individual cells.

Dr. Huser earned both his MS and PhD in Physics (Surface Science) from the University of Basel, Switzerland in 1994 and 1998, respectively. Prior to his

recruitment to the University, Dr. Huser served as a Scientific Capability Leader and Physicist at Lawrence Livermore National Laboratory (LLNL).



We also welcome Laura Marcu, PhD to the faculty of the Department of Biomedical Engineering, University of California, Davis. Dr. Marcu's Research interests include in vivo optical spectroscopy and imaging for enhanced detection of disease in human tissue (cancer, cardiovascular); fluorescence-based

minimally invasive medical diagnostics technology; high spatial- and time-resolution optical techniques for molecular imaging; optical bioMEMS; bionanophotonics: nanocrystals applications to molecular imaging. Dr. Marcu will also collaborate with the Center's extensive program in cancer research and will work closely with Stavros Demos, PhD, a scientist with Lawrence Livermore National Laboratory and the UC Davis Integrated Cancer Center, in furthering development of an optical biopsy system that detects cancer using laser spectroscopy methods.



Milestones – Congratulations !

New PostDocs:

- Goran Johansson, Post Doc
- Deborah Motton, PostDoc
- Chanel Yee, PostDoc
- Lening Zhang, PostDoc

Soon-to-be Graduates:

- Richard Fitch, PhD
- Samantha Fore, PhD
- David Hertzog, PhD
- Jim Landry, PhD
- Rupa Rao, PhD
- Heiko Winhol, MS
- Madeleine Akesson, BS
- Kelechi Chikere, BS
- Brian Curtis, BS
- Guang-Yin Swanland, BS
- Harras Zaid, BS

STAFF CHANGES

Welcome!

- Doris Grabski, Admin.
- Andrew Lague, Admin.
- Pamela Nelson, Admin.

Farewell!

- Kevin O'Brien, PhD, Knowledge Transfer
- Inez Talbott, Education
- Kerstin Feindert, Admin.

National News Brief – President Bush stresses on math and science education to boost US economy – January 31, 2006

Washington, DC: President Bush addressed the nation in his annual “State of the Union” address and called for a major new emphasis in math and science education in the American school system – to strengthen and bolster the nation’s future economy. In his address, he announced a new 136 billion dollars, 10-year commitment to support what he calls the “American competitiveness agenda” that he believes will employ the nation’s technology and research development

prosess in order to keep the economic edge against other international competitive countries like China and India. He further proposed that the US government train 70,000 additional high school teachers to help advance this effort and supports placement of courses in math and science so that students can gain early help in these subjects to improve their changes in well-paying jobs. He said, “the American economy is pre-eminent

but we can afford to be complacent. Out great advantage in the world has always been our educated, hardworking, ambitious people and we are going to keep that edge.” President Bush also said that he wanted to double federal funding to “the most critical basic research programs in physical sciences over the next 10 years,” in the hopes that new breakthroughs will come from leading science and technology fields. To read the President’s entire “State of the Union” address, please go to:

<http://www.whitehouse.gov/stateoftheunion/2006/>

Commentary from Director Matthews:

“As a scientist and Director of an NSF funded science and technology center, the President’s formal commitment to science and math education is critical. CBST is very committed to improving science literacy and I hope we will be able to see additional funding to support our efforts in building our nation’s next scientists, teachers, and business leaders.”

CBST Biophotonics High School Research Academy

“lights” up students interest in Science & Technology

A year-long program engaging cohorts of 15-20 high school students from neighboring Sacramento high school is giving students an opportunity to learn about the exciting field of Biophotonics; career options and college preparation in Biophotonics-related fields. This 200+ hour program will continue to engage students throughout the year and will provide students in real-world science, working directly with CBST scientists and researchers. Students get to visit CBST high-tech laboratories at the new Oak Park Research Building in Sacramento and work directly with CBST Undergraduate mentors who help guide their own original research. In tandem, with the Teller Education Center, CBST is offering teachers professional development programs in

Biophotonics. These Research programs are for grade 7-12 teachers who learn how to incorporate Biophotonics into their curriculum. The hope is that through these efforts, teachers will become part of a greater educational community working together to offer Biophotonics in their school and support community-based programs.

Pictured is Dennis Matthews (far left), Center Director with Michael Wright (far right), a teacher at Center High School. Students from Center High School are actively participating in the Academy. See related story – “*Science Fair Winners!*” – in this newsletter, p. 2.



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CBST Hosts 1st Entrepreneurial Workshop at 2006 Joint Annual Conference of the National Society of Black & Hispanic Physicists

In the ongoing commitment to increasing the diversity in science and technology, CBST Education and Knowledge Transfer leads Kevin O'Brien, PhD and Marco Molinaro, PhD hosted educational sessions on Entrepreneurial Opportunities in Biophotonics at this year's Annual Conference. This year's joint conference was held in San Jose, California February 15-19, 2006.

According to Dr. O'Brien, "CBST's role is to encourage entrepreneurship, especially among under represented groups. Since Biophotonics is an emerging market, these emerging markets always create opportunities. We want to make sure that under represented groups are aware of this opportunity and give them the tools to compete and take advantage of the opportunity."

The Joint Annual Conference brings together over 500 African American and

Hispanic American physics students and professionals. Considered a cutting-edge scientific program, the conference also has a strong student professional development program that involves over 120 oral and poster presentations covering topics from across the science and technology spectrum. Special emphasis is given to workshops and training sessions that include mentor-protégé match-making and a jobs recruiting fair.

The purpose and mission of these national societies is to promote the professional well-being of African American and Hispanic physicists within the international scientific community and within society at large.

For more information on the Societies and this year's conference, go to:
http://nsbp.org/cgi-bin/annual_conference.cgi



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