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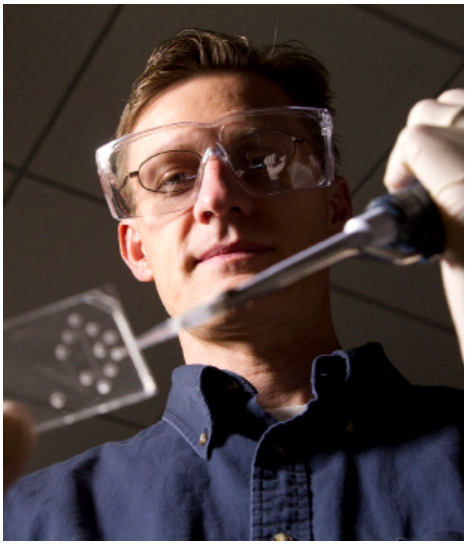
FACULTY newsletter

CPMS Physical and Mathematical Sciences

Detecting Cancer with Finger Prick



ABOVE : Professor Adam Woolley

Researchers at BYU have created a micro device that could both decrease the amount of blood and time needed to test for cancer-markers in a patient's blood.

Chemistry professor Adam Woolley's research, published in a recent issue of the journal, Lab on a Chip, details the device and technique that would allow for effective detection of biomarkers in a blood sample in a matter of minutes rather than days or weeks.

"You could walk into the doctor's office, the nurse could prick your finger instead of sticking a needle in your vein, and 30 or 40 minutes later, you'd get the results back in the same doctor's office," Woolley said.

Woolley said the current approach for detecting biomarkers, ELISA (enzyme-linked immunosorbent assay), works well as long as you're doing it in high volumes. This is why blood samples are usually sent to a clinical lab where they can run dozens of samples at the same time.

And while ELISA is efficient and cost effective if, say, there are 90 blood samples to process, the BYU micro device would allow a technician to look at just one sample quickly and cost-effectively to determine if there are markers for, say, breast cancer or prostate cancer.

The microchip researched and created by Woolley and doctoral student Weichun Yang could lead to effective testing for cancer-marking proteins with the use of only microliters of blood instead of milliliters – a smaller sample by a factor of a thousand.

"Detecting cancer biomarkers in a point-of-care setting can significantly improve the throughput of cancer screening and diagnose a cancer tumor at its early stage," said Yang, lead author on the paper. "These devices

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Geology Honors Emeritus Faculty Member

The BYU Department of Geological Sciences honored the life and work of emeritus faculty member Lehi F. Hintze on Thursday, November 11th by unveiling a portrait of the renowned geologist.

ABOVE : Portrait of Lehi Hintze, renowned geologist and retired BYU faculty.

Hintze was given a warm introduction by current department chair Scott Ritter, who said the beloved former professor was directly responsible for many important advances in Utah geology.

"Lehi put Western Utah on the map," Ritter said. "For those of us who are faculty and emeritus faculty, when you think of BYU Geology you think of Lehi Hintze. Most people that I encounter who have been here from other places know about Lehi Hintze and immediately associate his name with Utah geology."

Hintze performed his undergraduate work at the University of Utah before moving on to receive a Ph.D. in geology from Columbia University. Following his graduation from Columbia, he taught briefly at Oregon State University before coming to BYU. During his tenure as a professor in Provo, Hintze also served as the chair of the Department of Geological Sciences.

Though Hintze officially retired from teaching in 1986, that hasn't stopped him from continually pursuing his lifelong love of geology.

"He retired in 1986 but Lehi's still publishing," Ritter said. "To him it wasn't just a job — it was an adventure and a passion and a career."

Two of Hintze's most recognized accomplishments include his indispensible book, Geologic History of Utah, as well as the accompanying Geological Highway Map of Utah. Both have become essential tools for geologists studying the state.

Continued on page 2

Utah Academy Honors Prof., Student

ABOVE : Professor Karine Chesnel

Professors from across the state gathered at the Utah Academy of Sciences, Arts and Letters award ceremony on Friday November 5th, 2010. Dr. Karine Chesnel, from the BYU Physics & Astronomy Department, and her student Joseph Nelson won the Best Paper Award in the physical sciences category for their work on magnetic memory.

"The Utah Academy provides a great opportunity for us to communicate our scientific results to a more diverse audience than we usually do in scientific meetings," Chesnel said. "Thanks to the Utah Academy, we have a chance to share our research not only with the scientific community, but also other areas of study."

This was the first academic award for student Nelson and advisor Chesnel. Having only been a BYU Physics Department professor for two years and having completed all her schooling in France, Chesnel found this award to be very invigorating for her as a scholar and teacher.

"It can be challenging to adapt to a different academic environment and such a type of award is really encouraging to me," Chesnel said.

"It gives me more energy, enthusiasm, and confidence in our research and suggests that it can be of interest for the broader community."

While this paper focused on magnetic memory in thin films, Chesnel's overall area of research focus is characterizing the magnetic properties of nanosystems. She collaborates on these projects with other universities and national laboratories, such as the synchrotron facility at Berkeley, CA. Using techniques such as magnetic force microscopy, magnetometry, X-ray spectroscopy and scattering, Chesnel's goal is to better understand the morphology and reversal processes of magnetic domains in nanomaterials.

"We can learn the magnetic behaviors of certain particles when they are subjected to a magnetic field," Chesnel said. "It's important for many areas, especially technology and medical sciences, where the use and control of nanosystems is increasingly needed."

Chesnel and Nelson worked on the research for this paper for two years, alongside previous student Brian Wilcken. Wilcken has since gone on to work for Boeing in Washington State, and Nelson is now in medical school at Baylor Medical College in Texas, but both were excited at the news.

"It's not impossible to combine education together with advanced research," Chesnel said. "Sometimes we tend to think that we have to separate these two fields. I have learned here that we can perfectly combine both activities and that it is possible for an undergraduate student to be involved in a very advanced project, and then to produce a scientific paper that is recognized by the community."

by: Meghan Fletcher

Painting Continued

"Any person coming to Utah to do geology is armed – in the back of their pick-up or in their glove box or on the dashboard or in their backpack – with the Geologic History of Utah and his map," Ritter said. "And if they're going to start on a stratigraphic problem or a structural problem, what do you think they have in their glove box? What do you think they pull out when they're first trying to get oriented for their fieldwork? [Lehi's book]."

In order to honor Hintze's great contributions to the field, the department commissioned a portrait from Professor Robert Barrett of the BYU Department of Visual Arts. The portrait, which sets Hintze against a background that prominently features a mountain range and several other related geological objects, will be hung in the department's conference room upon its completion.

Ritter said he is very pleased with the result and feels the portrait pays proper tribute to Hintze and his great accomplishments.

"That image speaks to me," he said. "I see eyes filled with knowledge and wisdom and compassion when I look at this painting."

by: Steve Pierce

"I see eyes filled with knowledge and wisdom and compassion."
SCOTT RITTER

CS Prof. Recognized as Young Scholar

ABOVE : Professor Dan Ventura

At this year's Annual University Conference, Professor Dan Ventura, from the Department of Computer Science received the Young Scholar Award. Ventura has been a BYU faculty member since 2001, and was surprised by the award.

"I don't know why they picked me," Ventura said simply. "Lots of people are doing great things, and I don't feel like I deserve it any more than anybody else. It was a very pleasant surprise."

Ventura's humility is surpassed only by his passion for his job. He spends his time helping students with their research and encouraging them to broaden their visions.

"I've always been interested in: Can we make machines intelligent?" Ventura said. "This is kind of a hard question, because we don't really know what intelligence is. We recognize it when we see it, but it's hard to define."

Ventura's research has branched into applying artificial intelligence capabilities to creative tasks, with projects such as a program that can develop unique and inspiring pieces of art.

"It's interesting because they're really hard problems to wrestle with, but you're kind of asking these big questions about humanity," Ventura said. "Some people don't like the idea that machines can do what humans can do because it may lessen them as a human. But I think it's really interesting to look at ourselves as these fascinating creatures and question whether we can replicate it."

Beyond Ventura's passion for his subject matter, Ventura truly enjoys the atmosphere in his department. The unique qualities of the university make this job different than any other he has held.

"Everyone is about doing what's right, especially what's right for the students," Ventura said. "I enjoy knowing everyone has the best of intentions. We're friends. We all really get along well. It's my favorite part of the job."

by: Meghan Fletcher

Cancer Continued

provide a robust, quick, and portable system for early stage disease diagnosis."

Whereas ELISA uses a series of antibodies as hooks to grab targeted proteins and identify them, Woolley's method uses only one antibody step, which is then followed by a step where voltage is applied and the proteins are identified by the speed at which they move.

The new micro device can also detect multiple cancer biomarkers in blood simultaneously. In this particular round of research, Woolley and his team used the chip to detect four biomarkers simultaneously, but the device has the potential to detect upwards of 10 or 20.

Woolley said he and his team are now looking at ways to speed up the biomarker detection process even more. Ideally, he'd like to get the 30- to 40-minute process down to 20, 15 or even 10 minutes.

"If you learn from your doctor that you might have a life-threatening disease and that some initial testing must be performed, you don't want to wait weeks to find out what's going on," Woolley said. "You'd like to know that very day."

Woolley's research was funded by a National Institutes of Health grant awarded in 2006. Other co-authors on the study were post-doctorates Ming Yu and Xiuhua Sun.

Story Courtesy of BYU NEWS

Dates to Remember

College Christmas Luncheon
December 10, 11:30am-1:30pm
ESC Pendulum Court

Annual Awards Banquet
January 21, 6pm-8pm
3220-3224 WSC

Student Reseach Conference
Online abstract submissions open
January 15

Grants

Michael Dorais
Sponsor: NSF (Ocean Leadership)
Title: Integrated Ocean Drilling

Announcements

New Associate Chair Named in Statistics Department

Shane Reese has accepted an appointment to serve as the Associate Chair in the BYU Statistics Department. Reese replaces Scott Grimshaw, who has served since March 2006.

COLLEGE PUBLICATIONS

Chemistry and Biochemistry

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