



UNL News Releases

Chemistry professor honored for work on electrochemical biosensors

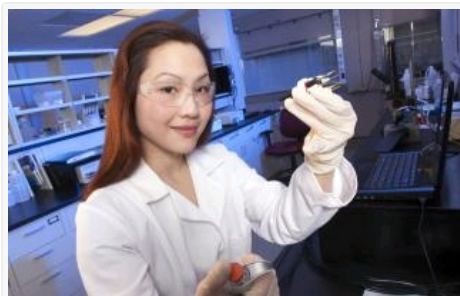
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Lincoln, Neb., July 15th, 2010 —

Finding a simpler, cheaper and quicker way to detect HIV would be an invaluable and long-sought aid in fighting the HIV/AIDS epidemic worldwide. Rebecca Lai hopes her research into electrochemical biosensors will provide such a tool.

Lai, an assistant professor of chemistry at the University of Nebraska-Lincoln, earned a five-year, \$455,000 Faculty Early Career Development Program Award from the National Science Foundation to continue her research. The CAREER award is NSF's most prestigious award for outstanding pre-tenure faculty to help them develop as teacher-scholars and researchers.



Lai's strategy for detecting the virus is to look for the presence of HIV antibodies, proteins the immune system produces to identify and neutralize the virus by binding to viral molecules called antigens.

Many antigens change shape when they interact with antibodies. By developing a method that monitors the structural change of the antigen, Lai can detect the presence of the antibody. In the case of an HIV infection, the presence of antibodies to HIV indicates infection with the virus.

To achieve that, she labels the antigen with methylene blue, a tracer molecule that accepts electrons when a specific voltage is applied. If antibodies are present, they interact with the antigens, causing a structural change and preventing the methylene blue from accepting electrons. The sensor will detect a large decrease in current in the presence of HIV antibodies. The current remains the same if no HIV antibodies are present. The mechanism is similar to blood glucose monitors familiar to diabetics in which the sensor determines the glucose level in a blood sample by measuring the electrical current, which is dependent on the amount of glucose present.

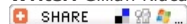
"Our biggest goal is to make a handheld biosensor similar to the glucose sensor, but for the specific detection of HIV," Lai said. Electrochemical sensing has the potential for diverse applications, ranging from cancer detection to finding toxins, explosives and even cocaine in the body and in the environment.

The grant will allow Lai to hire new graduate students and to develop two new UNL courses in electrochemistry. It will also take her into Nebraska's classrooms.

For Lai, educating young people in science and acting as a role model for young women and minorities in science is an important part of her career. She plans to develop hands-on summer workshops in biosensing technologies where Nebraska high school teachers can take what they've learned back to their classrooms. The first workshops will be in summer 2011.

"I am really interested in knowing the Nebraska high school teachers," said Lai. "I will have the chance to understand what they do, what they are interested in, and how I can improve the science education starting at a young age."

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