New Grant Awarded to IUSL for Prostate Cancer Detection Research

Dr. Wubao Wang, a senior scientist at the Institute for Ultrafast Spectroscopy and Lasers (IUSL) at The City College of New York, was awarded a $542,940 grant by the U.S. Army Medical Research and Materiel Command to develop noninvasive methods for detection of prostate cancer. Dr. Wang’s collaborators are Dr. Min Xu of Fairfield University, and Dr. James Eastham of the Memorial Sloan Kettering Cancer Center (MSKCC). Under the three-year grant, the scientists will develop a rectal near-infrared (NIR) light-based scanning polarization imaging unit and independent component analysis algorithm for detecting prostate cancer.

The current standard tests for prostate cancer are the prostate specific antigen (PSA) blood test and a digital rectal exam (DRE). Both tests, used alone or in combination, can indicate an abnormality, but do not provide a definitive diagnosis. A needle biopsy that removes tissue samples from the prostate gland is recommended to confirm whether cancer is actually present. However, a malignancy is discovered in only one-quarter of all men who undergo a prostate needle biopsy. In the majority of cases, patients are subjected to unnecessary anxiety, and some risk of infection from the invasive procedure.

Given the low degree of accuracy of PSA and DRE tests, and the need to avoid unnecessary, invasive procedures, a more accurate, noninvasive method of diagnosing prostate cancer is highly desirable.

Scientists at IUSL began investigating the use of spectral

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Research Scholarship Award

Thurman Solano, a Masters degree student in Physics, was awarded a $6,000 research scholarship for the 2007-2008 school year by the New York City Louis Stokes Alliance for Minority Participation (NYC-LSAMP) in science, technology, engineering, and mathematics. The scholarship is a competitive award based on overall GPA in science, engineering, and mathematics; and recommendation of the faculty mentor. It is available for a maximum of two years of graduate school, subject to annual renewal. Mr. Solano has been conducting research on ice detection and adhesion on metal surfaces at the IUSL since 2005 under the supervision and guidance of Dr. Wubao Wang, Senior scientist. He has been supported by the NASA-URC for Optical Sensing and Imaging.

The NYC-LSAMP is an alliance of 16 CUNY Colleges and the CUNY Graduate Center. The Alliance’s goal is to substantially increase the number of underrepresented minority students who pursue and graduate with Baccalaureate degrees in science, technology, engineering and mathematics.

Thurman Solano
polarization NIR imaging for prostate cancer detection in 1998. In vitro tests with cancerous and normal tissues, and with contrast agents, have since shown measurable spectral, scattering, and polarization differences between the tissue types based on water content, cell density, and adsorption of contrast agents. Under the newly funded project, “Development of Rectal Near Infrared Scanning Polarization Imaging Unit and Independent Component-Analysis Algorithm for Prostate Cancer Detection,” the researchers will take their observations from the laboratory NIR imaging system at IUSL, and develop a prototype device for clinical testing.

Initially, the laboratory imaging system will be modified to scan and acquire multiple two-dimensional images of normal and cancerous prostate tissue samples. An inverse image reconstruction algorithm and software program will also be modified to reconstruct 3-D images from the acquired 2-D images. After testing the modifications, a prototype portable NIR scanning imaging unit with a rectal probe suitable for imaging the prostate through the rectum will be built. After further testing on in vitro prostate and rectum tissue samples, the prototype imaging unit will be taken to MSKCC for in vivo clinical tests. Patients with abnormal PSA or DRE results will be examined with the NIR scanning imaging system, and the resultant 3-D images will be compared against ultrasound imaging and biopsy measurements of the same patients to evaluate the ability of the new system to optically distinguish and locate cancer in vivo.

Laser scientists at City College, led by Principal Investigator Dr. Wang, will be working with Dr. Min Xu, Assistant Professor of Physics at Fairfield University and an expert in inverse 3-D image reconstruction; and Dr. James Eastham, a surgeon and Professor in the Department of Urology at MSKCC.