

Darcy Kruse

Major: Physics and Mathematics
University: University of Missouri-Columbia
Faculty Mentor: Dr. Ping Yu
Mentor Department: Physics & Astronomy
Funded by: Life Sciences Undergraduate Research Opportunity Program

Optical imaging technique for viewing apoptotic cells

The study of programmed cell death or apoptosis in tumors has attracted increased interests. Recent research has shown that whether a cell lives or dies is related to its three dimensional environment such as the organization of cells and the surrounding extracellular matrix. Therefore, it is important to detect apoptotic cells and monitor their response to drug treatment in three dimensional tissues. In this project, a non-invasive biomedical imaging method was developed to achieve a holographic image of apoptotic cells in tumors. A setup based on a Mach-Zhender interferometer was used, with a HeNe laser (to be replaced by a near-infrared laser) as the light source. An electro-optic modulator was placed in the sample leg of the interferometer, producing frequencies on the order of 1 MHz which are unaffected by low frequency vibrations. The tissue can be scanned point by point and reconstructed in real time to create a clear three dimensional image on a visual display. This is an experiment still in process. Further understanding of tumor cells and finding a technology with which to effectively image the effect of drugs on these cells will help progress toward understanding and defeating cancer.