Contribution ID: **15** Type: **POSTER**

Microfluidic device for label-free cell deformation analysis

Breast cancer outcomes are closely linked to the stage at which the disease is first detected. To make early detection more accessible, a device capable of distinguishing between low- and high-HER2 breast cancer using optical tweezing has been proposed. Initial efforts using the optical trapping of SKBR3 cells have been fully manual, limiting precision, reproducibility, and throughput. This effort has produced a fully automated capability, allowing users to adjust experimental parameters, including laser power, image capture, and cell delivery parameters.

Automated control of the operation parameters for a microfluidic controller, microscope camera, and laser diode driver has been fabricated at the Norfolk State University Micron-NSU Nanofabrication cleanroom facility. The system synchronizes device operation, enabling consistent cell manipulation and deformation. The functional prototype can regulate microchannel flow velocity via microfluidic pressure control, trapping and deforming cells by modulating the current output for laser diode drivers and capturing and storing micrographs at user-prescribed intervals. The prototype was developed in compliance with biomedical device safety standards (IEC/IEEE 82079-1:2019, IEC 62304, IEC 60601-1) ensuring operational safety. This automated optical tweezing system enhances the process of cell trapping and deformation assays, representing a step toward developing a clinically relevant diagnostic tool for breast cancer detection.

Academic or Professional Status

Undergraduate Student

Author: ADERIN, Ayodeji (Norfolk State University)

Co-authors: Dr MARZ, Aylin (Norfolk State University); Dr BAHOURA, Messaoud (Norfolk State University); Dr MEAD, Patricia (Norfolk State University); Mr SEFA-BOATENG, Yaw (Norfolk State University)

Presenter: ADERIN, Ayodeji (Norfolk State University)

Session Classification: Poster Session

Track Classification: Materials & Devices: Materials & Devices - (b)