

## **NON-TECHNICAL ABSTRACT:**

Microfluidics technology involves precise control and manipulation of fluids in small channels typically in the micrometer range ( $10^{-6}$  m) and has been widely used to scale down many chemical and biological assays, such as DNA assays and protein biomarker analysis, from conventional benchtop scale to small microchip scale. Conventional sample detection for these microfluidic chips relies on fluorescence signal from the sample itself or the fluorescent tag attached to it. However, the sample labeling process can cause undesired results, especially for proteins. Herein, we propose to develop a compact, automated instrument for label-free, high-throughput biomarker analysis using a large-area UV imaging detector and novel UV-imaging microfluidic chips. We will use this new instrument to study two protein biomarkers in the neonatal mouse brain. The research results will demonstrate the application of low-cost, streamlined, high-throughput bioassays in the microfluidic format and also provide the PI with necessary preliminary data to compete for future external funding from different agencies, such as NIH's SC3 and NSF's REU and BRIGE programs. The instrument will also be used to develop student labs for two new courses, "Introduction to Microfabrication and Microfluidics Technology" and "Microfluidics Technology and Its Applications", to expose our senior and first-year graduate students at CSULB to this multidisciplinary area of growing importance and to provide them with working knowledge to get involved in this field. This is part of the PI's vision of "**Microfluidics @ the Beach**", which leads to our on-going efforts to establish the Center for Advanced Microfluidics Technology at CSULB for future research endeavors in biotechnology, chemistry, and engineering.