Multiplex Protein Analysis of Glioblastoma Multiform Cancer Cells Through the Use of Microring Resonators

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Abstract

Next generation cancer treatments rely on molecular diagnostics to identify the patients that would benefit from treatment. These diagnostics are part of the larger field of personalized medicine. One branch of molecular diagnostics is the detection of phosphoproteins that drive cancer growth and proliferation. Phosphoprotein information is limited because most current methods focus on a single target. Microring resonator arrays allows for the detection and analysis of multiple phosphoproteins. In this study, microring resonators, which are silicon photonic biosensors, are applied to samples of cell lysate from cancer cell culture.
Microring resonators are capable of up to 32-plex analysis. We use this multiplexing capability to detect multiple phosphoprotein targets in a single assay. This assay can analyze 12 phosphoprotein levels simultaneously in less than two hours. The method is capable of monitoring changes due to cell state and environmental alterations. Future implications of this study include monitoring changes in cancer cells due to treatment, differentiating and classifying cancer cells as well as cancer stages, and studying the effects of oncogenes in protein signaling.