Designing a Micromixer for Rolling Circle Amplification in Cancer Biomarker Detection

HAYRIYE ALTURAL, Department of Electrical and Computer Engineering, Boston University — Rolling circle amplification (RCA) is an alternative method to the Polymerase Chain Reaction based amplification for point-of-care (POC) diagnosis. In future personalized cancer diagnostic for POC applications, smaller, faster and cheaper methods are needed instead of costly and time-consuming laboratory tests. Microfluidic chips can perform the detection of cancer biomarkers within less analysis time, and provide for improvement in the sensitivity and specificity required for biochemical analysis as well. Rapid mixing is essential in the chips used in cancer diagnostic. The goal of this study is to design a micromixer for rapid RCA-based analysis and develop the assay time in cancer biomarker detection. By combining assays with micromixers, multi-step bioreactions in microfluidic chips may be achieved with minimal external control. Here, simulation results related to the micromixer are obtained by COMSOL software.

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