Controlled Concentration Of Short DNA Molecules On The Electrodes Using AC Electric Fields And Capillary Flow

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©2024 IEEE | DOI: 10.1109/RAPID60772.2024.10647005

***Abstract*— Point-of-care biomarker detection in sessile drops requires minimizing the coffee ring produced by the capillary flow. To address this issue, we have utilized AC electric fields to produce counterflow to capillary flow and slow down the buffer flow and concentrated molecules in the electrodes.**

Keywords—point-of-care, biomarker, electric fields, capillary flow

I. Introduction

Point-of-care (POC) biosensors provide important disease-related information quickly and efficiently in the clinics or fluorophore-labeled target molecules in electrodes and quantify the molarity based on the fluorescence intensity level [1]. However, the utility of DEP force to concentrate molecules in a sessile drop is difficult. Molecules in the sessile drop constantly move toward the edge of the drop by the capillary flow and produce a coffee ring around the drop. Additionally, electric field-induced osmotic flow (e.g., AC electroosmosis or electrothermal flow) drives molecules within the drop [2]. Studies have used AC electroosmosis to move fluid and subsequently carry the suspended particles with the flow. However, it has been demonstrated that the asymmetric electric field is required to produce the net motion of the fluid in a