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Low Cost and Disposable Lab on a Chip

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In this research, a low cost and disposable lab on a chip was designed and fabricated by screen printing. The chip was designed with integrated digital microfluidic microchip and electrochemical detector on single plate substrate. For the design, the chip consist of T-junction EWOD digital microfluidics microchip for merging buffer reagent and analyze droplets and an electrochemical detector at the end of T-junction EWOD. Both parts were fabricated by screen printed technique for supporting low cost manufacturing process. The EWOD microchip consists of silver paste for electrodes layers and PDMS for dielectric and Teflon® AF hydrophobic layers. Three electrodes of electrochemical detector consists of a carbon paste working electrode and a carbon paste counter electrode, and silver/silver chloride paste reference electrode for rapid analysis with minimal reagent consumption. In experiment, the electrochemical detector combine with EWOD microchip was tested to study possibility of moving (merging and transporting) ionized droplet and samples (buffer and analyzed droplet) on the microchip. For analysis, the EWOD chemical detector was analyzed for nicotinamide adenine dinucleotide for rapid analysis with minimal reagent consumption.

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