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## DESIGN AND ASSEMBLY OF A $\mu$ PAD FOR ZINC DETERMINATION IN CHILDREN'S SALIVA SAMPLES

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### ABSTRACT

Anticipating health issues with frequent monitoring as a strategy requires easy-to-use, real-time, and accurate analytical devices. Paper-based sensors coupled with the easy non-invasive collection of biological fluids, like saliva, make this combination particularly well-suited for frequent monitoring of infants' health. Saliva samples contain biomarkers that can provide the early detection of medical conditions, as it is the case of zinc. Regarding newborn babies and children, zinc deficiency can cause a decline in nutrition status, as well as compromise the child's cognitive behaviour. As so, zinc determination in saliva is crucial to assess its levels and the consequent child's state of development.

The main goal is to develop a microfluidic paper-based analytical device ( $\mu$ PAD) for rapid and on-site zinc quantification. This innovative  $\mu$ PAD methodology is portable and simple while providing low-cost analysis. Additionally, it is environmentally friendly, as it uses small amounts of reagents and samples, resulting in low waste production. For zinc determination, each device is fabricated by stacking two layers of filter paper discs (9.5 mm of diameter) that are aligned and inserted into a laminated plastic pouch, with 3 mm holes to insert the standard/sample solutions. The top layer contains the reagent (dithizone), while the bottom layer contains sodium hydroxide to ensure the reaction pH. When the standard/sample is loaded, a coloured pink complex is formed, and the intensity values are used to calculate the absorbance, establishing a linear correlation with zinc concentration. After validation by comparing to a reference procedure, the stability of the  $\mu$ PAD will be assessed under several storage conditions, and it will be applied to children's saliva samples.

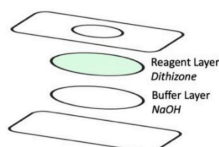


Figure – Reading unit of the proposed  $\mu$ PAD for zinc determination.

**Keywords:**  $\mu$ PADs; Zinc determination; Saliva samples; Newborns and children; Real-time analysis.

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