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Dissolvable sucrose barriers as tools for automated fluid control in paper diagnostics

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The current standard for diagnosis of infectious disease at the point of care (POC), lateral flow tests (LFTs), lack the ability to carry out multi-step processes inherent in gold-standard laboratory-based assays. One solution is to enable automated multi-step processing in paper-based devices using tools to control fluid transport. To this end, we have developed dissolvable sucrose barriers to create fluidic delays within our paper networks and automate sequential delivery of multiple reagents. We demonstrate their ability to produce well-defined fluidic delays from minutes to nearly an hour. Further, we present a paper-based device that can carry out an automated multi-step amplified immunoassay using the dissolvable sucrose barriers.

The assay consists of four steps: (1) delivery of sample premixed with antibody-conjugated gold nanoparticles, (2) delivery of a rinse, (3) delivery of a gold enhancement reagent for signal amplification, and (4) a final rinse. The paper-based device retains the ease of use of conventional lateral flow tests; the user simply adds reagents to the source pads and then folds the card to initiate the assay.

Biography

Tinny Liang is a senior majoring in Bioengineering at the University of Washington. She has spent the last three years working on paper-based diagnostics for low-resource settings in the lab of Professors Elain Fu, Barry Lutz, and Paul Yager. She is a co-author on several publications in this field. She plans to first pursue a Masters in Bioengineering at the University of Washington and then attend medical school.

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