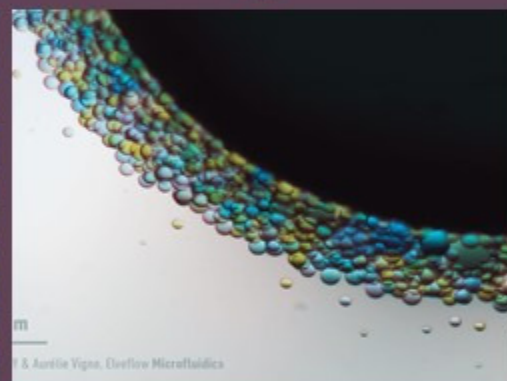
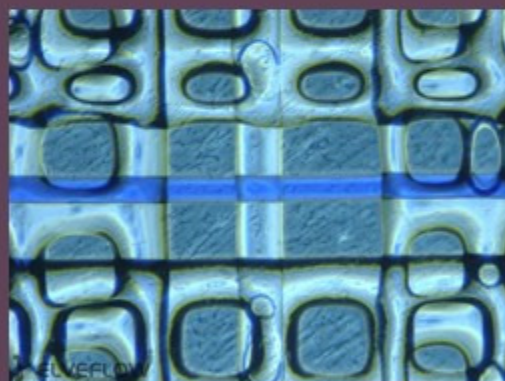
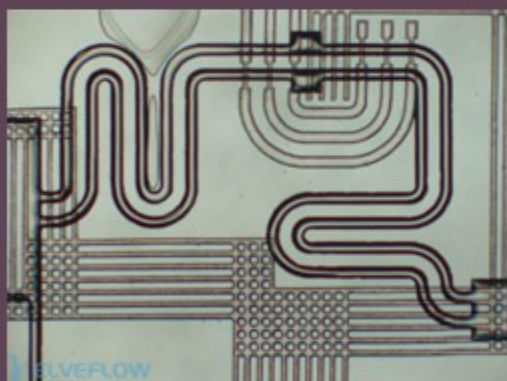


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Controlled deposition of reagents with 3D printer for the manufacture of lateral flow immunoassays

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Lateral flow immunoassays (LFI) are widely used worldwide for the detection of different analytes because they combine multiple advantages such as low production cost, simplicity, and portability, which allows biomarkers detection without requiring infrastructure or highly trained personnel. This work aims to provide solutions to some steps of the LFI manufacturing process, particularly the controlled dispensing of reagents in the form of test lines. Automating this stage¹⁵ of LFI production provides greater control over the amounts of reagents deposited and greater reproducibility between and within batches.

In this work, a Cartesian 3D printer was adapted and syringe pumps¹⁶ controlled by the printer itself were used. Thus, the control of their speeds, together with the output calibers in the dispensing tips and with the specific volume of each syringe, allowed optimizing the widths of the lines. As an application case, antigens of *Leptospira interrogans*, causal agent of Leptospirosis, were dispensed on nitrocellulose membranes, and the recognition reaction was tested.

The results obtained indicate that it is indeed possible to automate dispensing tasks with the proposed system, reaching quality levels similar to those obtained with commercial instruments, but at a much lower cost, and with a higher adaptation and configuration capacity. This makes it possible to avoid manual seeding, taking better advantage of previous immunochromatographic optimizations and facilitating the development and lab-scale production steps of LFI.

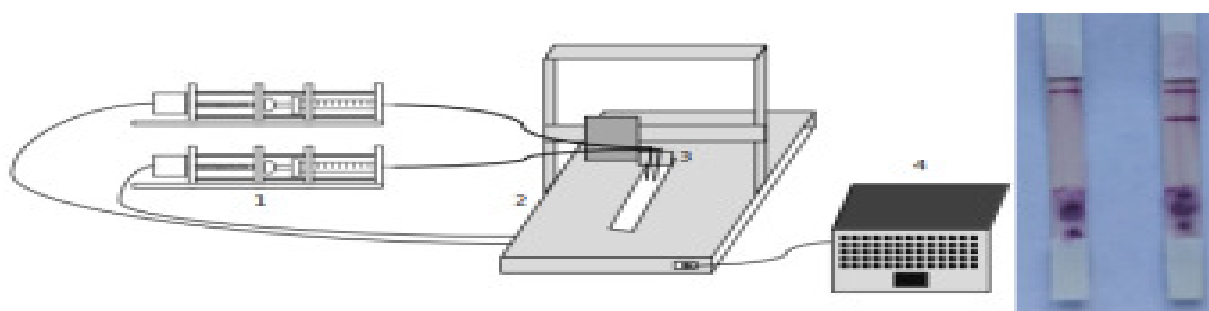


Figure 19: Scheme of the device and strips obtained

¹⁵Han, W. & Shin, J., *HardwareX*, 9, e00188, 2021

¹⁶Samokhin, A.S., *J Anal Chem* 75, 416–421, 2020