

Licensing and Technology Transfer Opportunity: Manipal University

Title of Technology Available:

Inkjet printing of paper-based devices using hydrophobic formulation

Brief Description of Invention:

We have transformed a simple office inkjet printer into paper-based microfluidic fabrication unit. By using in-house formulation in an office inkjet printer, we have performed selective hydrophobization on paper surface. Finally, we have leveraged the paper-based devices for detection of *Candida albicans* (Fungi) based a qualitative detection method.

Brief Background of Invention:

A major step in transforming a simple paper into paper-based analytical devices mainly relies on patterning of hydrophobic barriers. Conventional techniques like photolithography, vapor phase deposition, screen printing, flexography printing, plasma treatment, wax dipping and correction pens are used for fabricating paper-based devices. Alternatively, wax printing and inkjet printing are used. Several researchers leveraged wax printing for chemical sensing and diagnostic purpose. They have employed commercially available Xerox Phaser and Colorcube (solid wax printer) for fabrication. The main drawback of solid wax printer is high cost (1.5 lakhs) and unavailability in developing countries like India (due to constraints in offering service). Hence, inkjet printing is the only possible solution to achieve rapid and mass production of paper-devices.

Describe the final product:

In this work, we have developed a cost-effective (<0.20 \$) paper based device for the point of care detection of pathological fungi. The paper based device was fabricated by inkjet printing using in-house formulated ink. The printed designs exhibit hydrophobic property due to penetration of hydrophobic material in the paper pores and is capable of confining major aqueous solutions and other solvents. The functionality of the fabricated paper device was validated through a colorimetric test developed for biomarkers released by *Candida albicans* (a common fungal pathogen).

Technological Domain (Keywords):

Inkjet-printing, Paper-based devices, Microfluidics, Point-of-Care

Proof of Concept: NA

Stage of Development:

Advanced Prototype

Provide Information on Competitors who manufacture and/or sell similar products: NA

What are the unique advantages your innovation has compared to the competition:

The main advantage of this inkjet printing set-up is its low-cost (< 25\$). The formulation comprising a non-reactive material and offering visual contrast between patterned hydrophobic barrier and hydrophilic channels are prerequisites for better sensing also to prevent contamination. In our opinion, the results represent an excellent initial step towards the development of frugal and robust fabrication method for point-of-care sensing or diagnostics with the scope of extending it to smart-p

A few potential companies who might be interested in this technology:

Achira labs, Bangalore / (Any microfluidics or diagnostics company)

Intellectual Property Status: Indian Patent application with number 201941036676 filed in (2019)

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