Teaching the Scientific Method with Paper Microfluidics

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Objective

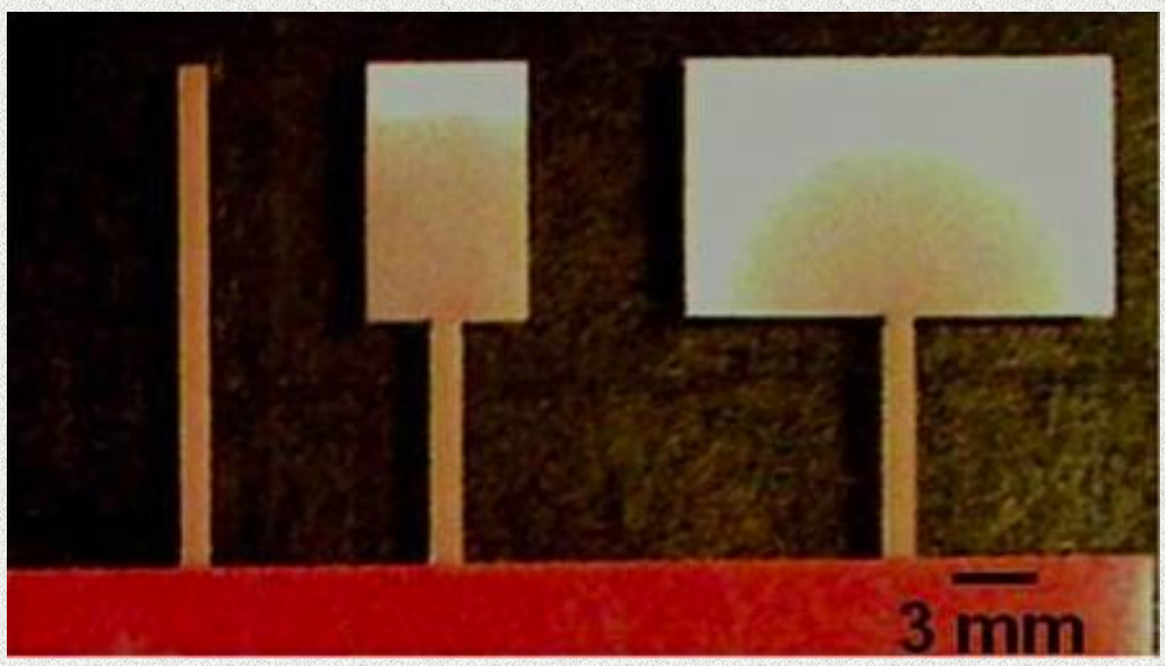
In this activity we introduce kids to the scientific method using paper microfluidics. Paper is ubiquitous in daily life. Moreover, paper microfluidics is readily commercially available and is one of the few microfluidic formats that kids might have encountered in their daily lives, either in form of glucose test strips for diabetes or pregnancy test strips that friends or family members may have used.

Glucose test strip

Procedure

To help students learn the scientific method, we setup a paper microfluidics experiment where students will:

1. Predict whether coloured liquid flows faster in a narrow or a wide strip of paper.
2. With a partner experimentally verify which paper geometry permits faster flow.
3. Compare their initial hypothesis to experimental results.



Flow of liquid in paper microfluidics networks with different width expansions. Picture from: *Microfluidics 2.0 workshop*, http://www.mf20.org/microfluidics-20-toolkit/controlling-flow-rates-paper-networks

Conclusions

This activity provides a fun and engaging way to introduce kids to the scientific method using paper microfluidics. The materials required are inexpensive to gather (filter paper, food dye), and the experiment is easy to perform and explain. The length of time it takes for a paper strip to fill with liquid influences the results of blood or urine tests that scientists perform. As a result, one must carefully design the geometry of a paper strip so that the tests takes a long enough time for a sufficient colour change to occur, but not too long that the patients have to wait too long. Feel free to try and modify this activity at outreach events near you. Have you tried this activity or something similar, or do you have ideas for improving the demo, please contact us (ayo.olan@gmail.com)!

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This demo was also inspired in part by an activity at the Microfluidics 2.0 workshop in Boston in 2012 (www.mf20.org).