Meetings International SciTechnol

J Pharm Sci Emerg Drugs 2018, Volume: 6
DOI: 10.4172/2380-9477-C6-021

INTERNATIONAL MICROFLUIDICS CONGRESS
&
International Conference on
ADDICTION RESEARCH AND THERAPY

August 13-14, 2018
San Diego, USA

Integrated fiber flow sensors for microfluidics interconnects

Boxue Chen and **Zheng Wang**
University of Texas at Austin, USA

In recent years, novel materials processing techniques involving PDMS and paper materials have enabled revolutionary progress in performance and capability of chip-scale microfluidics. However, micro-fluidic systems remain largely single-chip constructs, and are far from the level of sophistication that is typically seen in multi-chip multi-board electronic systems. A major limitation lies in the fluidic chip-to-chip interconnects, where the simple tubing materials and structures lack the monitoring and pumping functionalities that are needed in reliable microfluidic systems. In this context, we report the world's first fiber flow-rate sensor using new thermal sensing materials and device structures, both made possible by a novel multi-material fiber process, as a new form of chip-to-chip interconnects. In addition to the integrated flow-sensing capability, our device platform also resolves a fundamental trade-off between sensitivity, pressure drop, measurement range, and temperature rise in conventional thermal flow sensors. We develop a first-order one-dimensional heat-transfer model to establish the temperature response of ultra-long hot films in a fiber microfluidic channel. The improved flow sensing range in a multi-segment sensor, as predicted by the 1D analytical model, is corroborated by numerical simulations and experiments. Our work combines novel material systems and new device structures that deliver new functionality and significant improvements in performance. This unconventional form of flow sensors paves the way towards a complete functional overhaul of microfluidics feed lines needed in large-scale multi-chip integration in microfluidics and opens new possibilities in lab-on-fiber technologies.

boxuechen@gmail.com