

Integrated thin film silicon detectors for fluorescence sensing

Unmet Need

Microfluidic chip-based systems allow for rapid and sensitive biochemical analyses of very small sample quantities. Due to the prevalence of optical equipment in laboratories, optical detection has become the most popular method for lab-on-a-chip (LOAC) devices. LOAC systems represent an attractive tool in clinical diagnostics that can offer on-site laboratory testing without requiring expensive and large equipment. In reality, however, current fluorescence-based LOACs requires bulky and expensive external detection systems. Thus, for LOAC system to become a point-of-care diagnostic device, it must be portable, self-contained and cost effective. There have been several optical sensors investigated for on-chip microfluidic systems, however, few of these are affordable and fully integrated.

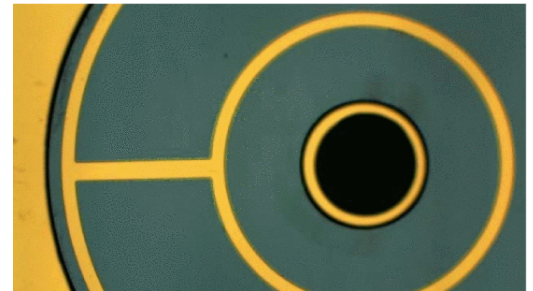
Technology

Scientists at Duke have developed a cost effective, fluorescent sensor for use in microfluidic systems. The optical system is comprised of custom thin film silicon photodetectors and a top and bottom plate for fluorescence sensing. The system is fully optimized for integration with a lab-on-a-chip (LOAC) device. A novel optical design avoids the use of costly, bulky optical filters and achieves a high signal-to-noise ratio. The photodetector has been tested in lab and shown to exhibit a linear response to different fluorophore concentrations.

Advantages

- Low cost fluorescence sensor is integrated directly into microfluidic system
- The silicon film does not interfere with the flow of fluid through a microfluidic channel
- Enables the design of new portable and self-contained on-chip diagnostic tools
- Excellent signal-to-noise ratio without the need for expensive optical filters

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Inventor(s)

- Jokerst, Nan Marie
- Dighe, Aditi "Aditi"
- Fair, Richard

Links

- [From the lab of Dr. Nan Jokerst](#)
- [From the lab of Dr. Richard Fair](#)

College

Pratt School of Engineering

For more information please contact

Koi, Bethany
919-681-7552
bethany.koi@duke.edu

Publications

- [Integrated Thin Film Silicon Detectors for Fluorescence Sensing \(IEEE Sensor, 2018\)](#)
- [US Patent App 16/654,657](#)