

Microfluidic Device for Optical Sorting of Heterogeneous Cell Samples

A modular chipset to enhance the speed and reliability of cell separation by optical trapping

Forensic DNA labs process complex sample mixtures from multiple donors. These samples often contain heterogeneous mixtures of different cell types and current methods to separate these samples are time consuming and often imperfect. Every year sexual assault cases remain unprocessed and accumulate in number due to the extensive manual processing times required for these samples. Microfluidic devices (micro-devices) have been developed incorporating common laboratory approaches and equipment; these devices present an option for optimization of the processing time of these unique forensic samples and can be designed to maintain chain of custody integrity and prevent sample tampering.

The technology

Researchers at Virginia Commonwealth University have developed an integrated micro-device that is able to process complex, compromised forensic case samples such as separating sperm cells from epithelial cells in cases of sexual assault. This technology includes the microchip design, as well as the process to separate cell types from mixed forensic biological samples prior to downstream DNA/human identification analysis. A custom modular microchip has been designed that can interface with a standard optical tweezer microscopy platform and contains a closed system that provides hands-free manipulation and sorting of cells.

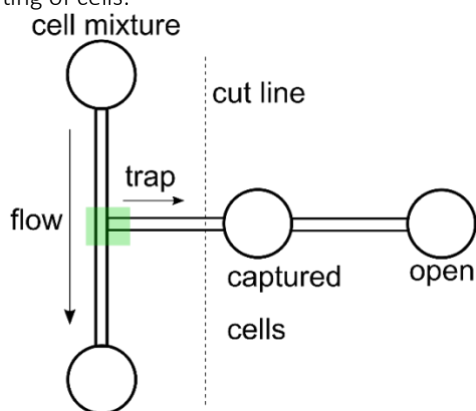


Figure 1. Schematic of microfluidic device and valve system to maintain sample integrity after optical trapping.

Benefits

- » Decreases sample processing time
- » Functions within traditional forensic workflow
- » Sample processing is hands-free in a closed environment
- » Short and minimal sample preparation (3-5 min prep time & non-toxic materials)

Applications

- » Separation of complex samples with multiple cell types for forensic analysis
- » Separation of heterogeneous samples in tissues for research purposes

Patent status:

Patent pending; U.S. and foreign rights are available.

License status:

This technology is available for licensing to industry for further development and commercialization.

Category:

Biomedical

VCU Tech #:

16-033, 21-016

Investigators:

[Tracey Dawson Green, Ph.D.](#)
[Sarah Seashols-Williams, Ph.D.](#)
[Joseph Reiner, Ph.D.](#)

Contact us about this technology

Magdalena K. Morgan, Ph.D.
Director of Licensing
mkmorgan@vcu.edu
(804) 827-6095