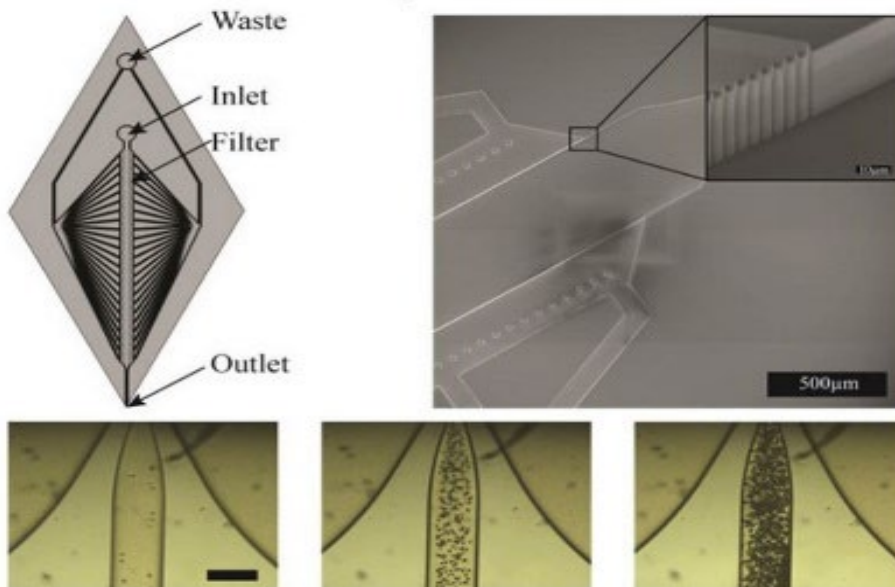


# Microfluidic 3D-printer nozzle with cell concentrator



Ref. Nr

6.1787

Keywords

3D bioprinting; cell concentration; microfluidics, tissue engineering

Intellectual Property

US 20210395659

Publications

Ludovic Serex et al 2021 Biofabrication 13 025006

Date

25/04/2023

## Description

In the field of tissue regeneration, three-dimensional (3D) bio-printing holds great promises. However, even though bioprinters have undergone improvements, the dispensing methods still lack critical functionalities essential to mimic the anatomy of organs. In particular, the manipulation of solutions containing high cell densities can be challenging, as most extrusion based printers feature long tubing to bring cells to the printing head. The ability to adjust the cell concentration on demand is essential in extrusion-based bioprinting, as it allows the user to print tissue at cellular concentrations closer to those occurring in native tissues.

The invention features a microfluidic device with a design conceived to filter particles/cells in a sample while exploiting a crossflow action to concentrate said sample along a flow channel. A concentration gradient is formed in the main flow channel due to side channels withdrawing the excess liquid. The cell extraction through the side channels is prevented due to two parallel rows of pillars acting as tangential filters. The device permits the concentration of a sample of at least two orders of magnitude.

## Advantages

The device is particularly suitable for inclusion into a cell-dispensing 3D (bio)print head/nozzle. It can perform cell concentration in situ right prior to dispense, thereby avoiding dead volumes and shear stress in the tubing of the printer, and allowing the cell suspension to travel in the tubing at a reasonably low concentration. Thanks to the implemented design, the risk of clogging is minimized, and the user can adjust the cell concentration for printing on demand.

## Applications

- 3D bioprinting
- Tissue engineering, organoids production