

Microfluidic Impedimetric Biochip and Related Methods for Measurement Chip Manufacture and Counting Cells

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Abstract : This paper is about methods and tools for counting particles of interest, such as cells. A microfluidic system with interconnected electronics on a flexible substrate, inlet-outlet ports and interface schemes, sensitive and selective detection of cells specificity, and processing of cell counting at polymer interfaces in a microscale biosensor for use in the detection of target biological and non-biological cells. The development of fluidic channels, planar fluidic contact ports, integrated metal electrodes on a flexible substrate for impedance measurements, and a surface modification plasma treatment as an intermediate bonding layer are all part of the fabrication process. Magnetron DC sputtering is used to deposit a double metal layer (Ti/Pt) over the polypropylene film. Using a photoresist layer, specified and etched zones are established. Small fluid volumes, a reduced detection region, and electrical impedance measurements over a range of frequencies for cell counts improve detection sensitivity and specificity. The procedure involves continuous flow of fluid samples that contain particles of interest through the microfluidic channels, counting all types of particles in a portion of the sample using the electrical differential counter to generate a bipolar pulse for each passing cell—calculating the total number of particles of interest originally in the fluid sample by using MATLAB program and signal processing. It's indeed potential to develop a robust and economical kit for cell counting in whole-blood samples using these methods and similar devices.

Keywords : impedance, biochip, cell counting, microfluidics

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