

Coulter Counting and Particle Shape Sensing with a Single Pore Membrane

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BRIEF DESCRIPTION

UCI researchers have fabricated a single pore membrane with an undulating pore diameter and tested its ability to differentiate particle shape, size and ductility. This new membrane and technique has demonstrated the ability to count/sort particles at order of magnitude higher concentrations than currently available Coulter counters..

FULL DESCRIPTION

Single nanopores have been applied as a basis for detection of single molecules, viruses, particles and cells. Complete blood count tests in hospitals utilize single-pore membranes. Currently available membranes cannot differentiate between objects of the same volume but of different shapes and also cannot determine when multiple particles or cells are in the pore thus the analysis has to be performed from diluted samples.

Researchers at the University of California, Irvine have developed a device and method for detecting and characterizing the physical properties of single particles and cells. The invention involves using single pores with varying cross-section along the pore axis. Particles of different shapes when passing through the pore will 'probe' the internal structure of the pore differently which is reflected in the recorded transmembrane current signal. Various shapes can therefore be easily distinguished on a single particle level. A pore with undulating pore diameter can also detect transient sticking of particles in the pore, it can confirm whether any individual particle completely translocates the pore, and it allows unambiguous detection of multiple particles in the pore, which would previously corrupt the results, so that higher analyte concentrations can be used for faster analysis. In addition, the device can quantify the ability of the particles to deform as well as their surface charge.

SUGGESTED USES

- Detection of particles and cells of various shapes; deformed cells might be an indication of an illness
- Characterization of mechanical and physical properties of particles currently used in the drug-delivery systems
- Detection of conformational change of molecules.

ADVANTAGES

The UCI membrane system has several advantages over the current technology used in the detecting and counting particles and cells:

- (i) it enables analysis of particle shape
- (ii) it enables study of the interaction of particles with the pore surface
- (iii) it allows performing the analysis from at least 10 times higher concentration of the analyte

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OTHER INFORMATION

KEYWORDS

Coulter Counter, Membrane, Particle Detection, Blood Count, Resistive Pulse Sensing

CATEGORIZED AS

- » **Environment**
- » Other
- » **Materials & Chemicals**
- » Biological
- » Chemicals
- » Nanomaterials
- » Thin Films
- » **Medical**
- » Diagnostics
- » Research Tools

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	9,658,206	05/23/2017	2012-771

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