NU Tech
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(A72)

Novel Microfluidics Platform that can Distinguish Various Microbes

Background:

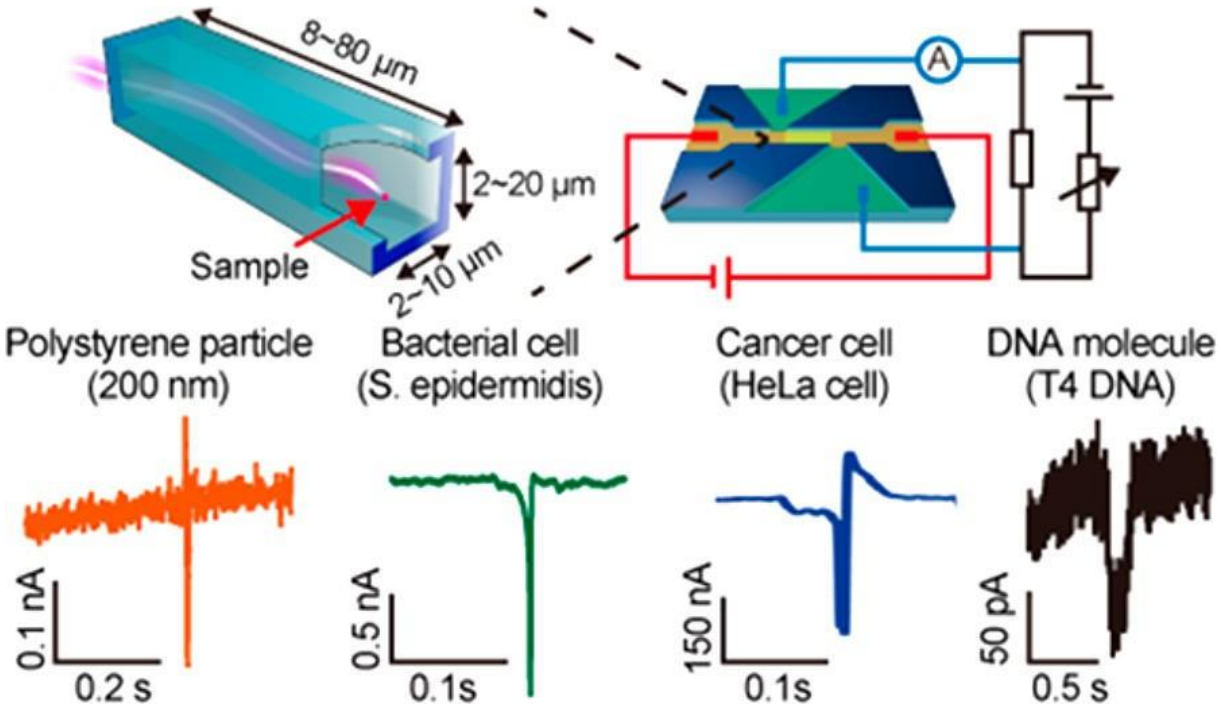
Measurement of Ionic current sensing via microfluidic channel is a powerful tool to detect various biomolecules such as cells, bacteria, and viruses. However, there is an inherent limitation to the detectable particle volume, 1% of the microfluidic channel volume, which critically hinders applications to realistic samples mixed with various microbes.

Technology Overview:

Nagoya University researchers have successfully developed a new system to distinguish various biomolecules including polystyrene nanoparticles (volume: 4 aL), bacteria, cancer cells, and DNA molecules from mixed samples by utilizing a long microscale microfluidic channel structure. Furthermore, the new system can differentiate drug-resistant bacteria by measuring a transient current in a microfluidic bridge circuit. The method substantially suppresses the background ionic current from the μA level to the pA level, which essentially lowers the detectable particle volume limit and enables to detect various types of microbes. Therefore, the new method potentially expands applications to a medical device including to identify influenzas virus types, which have been difficult to measure by previous microfluidic technologies with one device.

Figure:

Detection of nanoparticles, bacteria, cancer cells, and DNA molecules in the microfluidic bridge circuit.



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Further Details

HirotoshiYasaki et al., A real-time simultaneous measurement on a microfluidic device for individual bacteria discrimination. Sensors and Actuators B: Chemical Volume 260, 1 May 2018, Pages 746-752

Hirotoshi Yasaki et *al*., Effect of channel geometry on ionic current signal of a bridge circuit based microfluidic channel. Chemistry Letters 47(3) · January 2018

Hirotoshi Yasaki et *al*., Substantial Expansion of Detectable Size Range in Ionic Current Sensing through Pores by Using a Microfluidic Bridge Circuit. J. Am. Chem. Soc., 2017, 139 (40), pp 14137–14142

IP Status: Patent application submitted

Seeking: Licensing

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