OMICS International
conferenceseries.com

Hiroaki Suzuki, J Nanomed Nanotechnol 2015, 6:6
http://dx.doi.org/10.4172/2157-7439.C1.025

5th International Conference on
Nanotek & Expo
November 16-18, 2015 San Antonio, USA

Electrochemical autonomous microfluidic devices for analytical applications

Hiroaki Suzuki
University of Tsukuba, Japan

Miniaturization of analytical devices has advanced remarkably over the last two decades. We have developed various microfluidic components to be used for this purpose. To realize smart user-friendly portable devices, microfluidics based on capillary action controlled by active valves is attractive. To realize simple active valves that facilitate integration, electro-wetting is attractive. A simple hydrophobic valve can be created by forming a gold electrode in a flow channel structure made from hydrophilic glass and hydrophobic poly (dimethyl-siloxane) (PDMS). A solution that moves by capillary action stops at the valve. The valve is opened upon the application of a potential to the electrode to change its wettability. Alternatively, a platinum electrode with a hydrophobic self-assembled monolayer (SAM) of alkane thiolate can be used as a valve. At an appropriate potential, the SAM is dissociated reductively and the hydrophilic platinum surface is exposed. The electrochemical valves can be opened autonomously by wetting a zinc part formed in the other controlling flow channel and changing the mixed potential. Autonomous injection mechanisms or microfluidic display can be realized. Precise control of the timing for switching can be implemented by using an array of controlling flow channels. Furthermore, the autonomous mechanisms can also be used with other microfluidic components for programmed multiplexed processing of solutions in sophisticated analytical devices.

Biography

Hiroaki Suzuki received his BE and ME degrees in Applied Physics and his PhD in Bioelectronics and Biotechnology from the University of Tokyo, Japan, in 1981, 1983 and 1993, respectively. Since 2004, he has been a Full-time Professor at the Graduate School of Pure and Applied Sciences, University of Tsukuba. His current research interests include micro-fluidics, photonics, plasmonics and nano-robots.

hsuzuki@ims.tsukuba.ac.jp

Notes: