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Development of fluorescence-based biochip for rapidly screening of dengue virus

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Here we present a simple method to rapidly screen the different types of Dengue virus simultaneously in human blood using fluorescence-based biochip. The biochip with several surface materials fabricated by Micro Electro Mechanical Systems (MEMS) technologies has the advantages of simple, cost effective, mass production and integration capabilities. Then, silica and gold patterns on the chip are chemical treated through surface functionalization. With high sensitivity and high selectivity, this biochip can be a powerful tool used for rapid, reliable detection of Dengue virus using fluorescence imaging. The detection of multiple targets simultaneously plays a crucial role in the diagnosis of diseases and conditions, especially for early stage treatment. A single target is not sufficient for high-specificity detection. Therefore, combining several biomarkers on one chip can not only greatly improve detection accuracy but also reduce detection time and the volume of samples. In this study, the biochip was successfully fabricated by MEMS technologies. In the fabrication processes, gold and silica patterns were defined by two photolithography processes, respectively. Due to the stability in the following surface functionalization processes, chromium was used to separate gold and silica area. The fabricated biochip was then immobilized with different fluorescent dye labeled ssDNA. Subsequently, fluorescence scanner was used to observe fluorescence intensity on the biochip for rapidly screening the different types of Dengue virus simultaneously

Biography

Shin-Hung Kuo received the BS and MS degrees from the Department of Electrical Engineering at the National Cheng Kung University, Taiwan, in 2007 and 2009. He is currently a PhD student in the Department of Electrical Engineering at National Cheng Kung University. His research interests have been mainly focused on biosensor, microfluidic and MEMS technology for biomedical applications.

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