OMICS Group Conferences
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International Expo and Conference on
Analytrix & HPLC

October 22-24, 2012 DoubleTree by Hilton Chicago-North Shore, USA

A straightforward label-free Au-LSPR portable detection system

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It is helpful for early diagnosis, staging, prognosis, and mediating the aggressiveness of viral infections and cancer by providing real-time information to doctor. However, the common detecting methods (i.e. ELISA or flow cytometry) have some drawbacks to reflect the real-time information. For example, the method of ELISA usually took 2~3 days to complete the whole process. Therefore, development of detecting method which has properties such as high throughput and sensitivity is essential. In this report, a rapid and highly sensitive chip has been developed for detecting low concentration molecules or specific rare cells. Unlike time-consuming ELISA and flow cytometry, the advantages of the chip include low-cost, reusability, high sensitivity and easy preparation. This chip is based on durable gold nanostructures on transparent glasses with uniform spacing which having an average nano-particle size and inter-particle gap of 8 nm and 11 nm, respectively. According to results, the optical response of localized surface plasmon resonance (LSPR) is strongly dependent on the chemical/biological molecule binding location. The optical response of LSPR increases when binding molecules are immobilized at the inter-particle spacing. The anti-Human immunoglobulin G molecule was applied as target to detect. Chemical immobilization had been used as bridge between the Human immunoglobulin G molecules and chip. The experimental result indicates that the limit of detection for anti-Human immunoglobulin G molecules is 10 ng/mL. In the next step, we will attempt to detect pathogens or specific rare cells (i.e. circulating tumor cells or cytotoxic T lymphocyte) with special functionalization due to the high sensitivity by using our Au-LSPR chips. Now mass-production of the Au-LSPR chips can be achieved according to our patented microwave-plasma methods. Moreover, a hand held equipment of UV absorption has been designed to replace the large apparatus. We hope the Palm-sized equipment for detecting specific molecules that can be applied to Point-of-care testing in the future.

Biography

Kuan-Jiuh Lin is the distinguished professor of department chemistry of National Chung Hsing Universtiy, Taichung, Taiwan. His research fields focused on the exploring interfacial electric-materials, such as nanoparticles embedded on glass substrates and photoanode solar cells. He has published more than 100 papers in reputed journals and over 30 patents.

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