2006 한국생물공학회
추계학술발표대회
2006 FALL KSBB MEETING

2006. 9. 7(목)-8(금)
코엑스

SEPTEMBER 7-8, 2006
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Bio-Korea 2006
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주 최 : (사)한국생물공학회
후 원 : 한국과학기술단체총연합회, 무역협회, 보건산업진흥원

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P905 **Ultrasensitive Electrical Detection of Prostate Specific Antigen with Gold Nanoparticle-Antibody Conjugate Using Scanning Tunneling Microscopy**

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We was developed a novel ultrasensitive detection of prostate specific antigen (PSA) using scanning tunneling microscopy (STM). PSA is a marker for prostate cancer and it has been identified as a potential marker for breast cancer in women2). In the case of breast cancer, the PSA levels in women are substantially lower in men making validation studies difficult with conventional diagnostic tools1). For the early diagnosis of the prostate cancer and the breast cancer, an ultrasensitive detection system for PSA is being required. In this study, novel ultrasensitive PSA detection method by STM using gold(Au) nanoparticle-antibody conjugate was developed. As a result, the frequency of current peaks was generated in accordance with the surface density of the dispersed Au nanoparticle on the surface, which was represented as periodogram with its logarithmic regression curve. And, the change of the power spectrum was observed in accordance with the concentration of PSA molecule. The lowest detection limit of the assay system for PSA is 1pg/mL.

Keywords : Prostate Specific Antgen , Gold nanoparticle-antigen conjugate , Electrical detection , Scanning Tunneling Microscopy

P906 **Functional Analysis of Olfactory Receptor I7 Using Neurochip**

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The initial step in olfactory sensation involves the binding of odorant molecules to specific receptor proteins on the surface of olfactory receptor cells. Olfactory receptors coupled to G-proteins activate adenylyl cyclase leading to the generation of cyclic-AMP(cAMP), and cAMP causes membrane depolarization by activating a cation-selective cyclic nucleotide-gated(CNG) channel. In this work, neurochip was applied to the cell-based measurement of generated membrane potential. Human embryonic kidney (HEK) - 293 cells stably expressing I7 were transfected with gustatory CNG (CNGgust) channel of rat for the generation of membrane potential. Micro-fabricated electrode arrays were employed for the measurement of electrical responses to the odorant-receptor binding. The cells were cultured on polylysine-coated electrodes. Stimulating olfactory receptor with its specific odorant caused the increase in intracellular Ca2+ level, which was measured using a neurochip. The extracellular voltage signal generated by ion-flux through CNGgust channel of cell was around 10 mV. These results demonstrate that the microneurochip can be used as a secondary transducer for the olfactory biosensor.

Keywords : olfactory receptor , membrane potential , neurochip

P907 **Fabrication of Two Component Protein Array by Sequential Photopatterning**

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We demonstrated a multi-component protein patterning method on a super hydrophilic amino-dextran surface with UV irradiation using photoactivatable biotin while downsizing the protein spot size under buffer condition. Amino-dextran surface was employed to reduce non-specific binding of proteins by forming super hydrophilic surface1). Spotting method using a microarrayer, which is a widely used method for protein array, has some problems, such as difficulty in decreasing spot size less than 100 ㎛ and complication with handling in buffer condition2). Photoactivatable biotin was used for the protein photopatttening with projection photolithography. It was activated with exposure to 330-360 ㎚ UV light, and attached to irradiated sites selectively on amine surface. The amine surface was formed with amino-dextran after silanization with 3-aminopropyltrimethoxysilane on glass. To decrease the protein spot size, the microscope system was used by performing projection photolithography. Using the microscope system with optimized configuration, about 25 ㎛ protein spot was obtained using a shadow mask of 100 ㎛ hole size. With the established method, two-component protein array was fabricated.

Keywords : amino-dextran surface , photobiotin , projection photolithography , protein immobilization , avidin-biotin interaction

P908 **Surface Plasmon Resonance Imaging Study**

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The surface plasmon resonance (SPR) imaging technique has been used to characterize thin organic and biopolymer films at metal interfaces in a spatially resolved manner. Because this approach enables the measurement of interactions between unlabeled biological molecules and surface-bound species in an array format, SPR imaging is thought to be well-suited not only for DNA and protein microarrays but also for small-molecule microarrays.1)The biosensor for detection of small molecules or diagnosis markers had been required high sensitivity. One of the methods for enhancing sensitivity was surface modification to provide bio-adaptable space. Recently the best favorable surfaces were polymers with 3-dimensional space such as dextran, hydrogel, dendrimer, etc., and biotin, avidin, protein G, etc. can use affinity binding.In this study, the surface was modified to oxidated dextran for enhancing of sensitivity and the model proteins were immobilized on modified surface using microarrayer. We observed images of these spots and compared with image of immobilized proteins on 2D surface. These results demonstrate that SPR imaging is well suited to study biomolecular interactions.

Keywords : SPR , Image , Biosensor , Biomolecular interaction