Antibody Immobilization using Sol-Gel Derived Bio-surfaces and its Application to Immunosensor

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Recent advances in chemical and biological analysis have involved the incorporation of biomolecules onto functional surfaces of new devices, which are capable of selective and high affinity binding to analytes of interest. Because sol-gel technique has been well developed and employed to prepare various materials, it is possible to fabricate a structured bio-surface through the easy control of chemical composition and low temperature synthesis[1].

In this study, for preparing the substrates, inorganic silica based gels were used as substrates for creating the chemically patterned surfaces. Gels were produced by hydrolyzing tetraethylorthosilicate (TEOS) in ethanol. To alter the chemical activity of the surfaces towards guiding interactions between proteins and synthetic surfaces, the silica network was modified by incorporating different chemical groups such as thiol functional group. The introduction of functional group was carried out using mercaptopropyl triethoxysilane (MPTS) during TEOS hydrolysis. The preparation of modified thin film was obtained by sol-gel dipping process, and then the formation of protein microarray was carried out using microarrayer (Nano-Plotter NP 1.2, GeSiM mbH, Germany). The possibility for immunosensor was investigated using prepared protein microarray.

The topographies of the fabricated thin films were investigated by atomic force microscopy (AFM, XE-100 PSIA, Korea). The proposed porous structure promotes to increase the amount of protein immobilized on the sol-gel derived bio-surface. The antigen-antibody interactions were investigated by fluorescence microscopy (Leica Microsystems AG, Germany) and the labeled proteins with fluorescence isothiocyanate (FITC).

Reference

1. Wenjian Weng, Sam Zhang, Kui Cheng, Haibo Qu, Piyi Du, Ge Shen, Jun Yuan, Gaorong Han (2003), Sol-gel preparation of bioactive apatite films, *Surface and Coatings Technology* **167**, 292-296.