生物物理学报(2007) 23(3), 215-222

PDF文档

胶体金修饰纳米免疫传感器的制备与性能测定

谢辉、蔡继业*
广州市暨南大学

基于原子力显微术，利用电化学、胶体金修饰等，进行与生物分子的结构与功能相关的免疫识别研究。利用分子自组装技术，设计出胶体金修饰CD29 免疫传感器，并将原子力显微镜（AFM）针尖修饰CD29 后，利用力曲线模式，对免疫传感器进行分子识别及活性点分析。CD29免疫传感器的活性点分析表明，只有62.5%的表面区域有明显力的黏附性，即活性部位，其余部分无活性。通过AFM扫描表面，发现抗体在表面聚集成团状，失去蛋白分子的原有结构，且将活性部位隐藏于内部。推断出这可能是导致蛋白失活的主要原因。

NANOSTRUCTURES AND MOLECULAR FORCE BASED ON A HIGHLY SENSITIVE CAPACITIVE COLLOID GOLD IMMUNOSENSOR

Atomic force microscopy (AFM) and electrochemistry analyses were employed to construct and characterize the surface of biosensing. There is self-assembling anti-CD29 antibody on the electrode gold surface. Under AFM, there is a complete coverage of anti-CD29 antibody at an optimal concentration. The anti-CD29 were immobilized on electrode surface of the immunosensor exhibited globular-shape topography with some degree of aggregation. Extensive force-curve analysis allowed mapping the functional spots of the anti-CD29 immunosensor. Surprisingly, although immunosensing surface was fully covered by anti-CD29 antibodies at the optimal concentration, only about 62.5% of coated anti-CD29 molecules (spots) on the electrode surface were able to specifically capture or bind CD29 antigen under AFM. Despite limited functional spots, however, the anti-CD29 immunosensor was highly specific and sensitive for sensitizing CD29 antigen in solution. Consistently, the anti-CD29 immunosensor had a greater electrochemical capacity to sensitize, supporting the molecular force-based finding by AFM. Thus, the present study elucidated the nanostructures and molecular force bases for the immunosensing capacity of a highly sensitive capacitive immunosensor.

关键词

原子力显微术(Atomic force microscopy); 免疫识别(Immune recognition); CD29; 免疫传感器(Immunosensor)