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研究论文

纳米金标记电化学检测DNA特异性结合蛋白

潘沁, 许利剑, 王志飞, 陆祖宏, 何农跃

东南大学生物电子学国家重点实验室, 南京210096

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摘要 将单分子发夹寡核苷酸固相延伸形成双链寡核苷酸, 以纳米金颗粒标记NF-κB并银染放大, 采用阳极溶出电位法对NF-κB进行检测. 结果表明, 本法检测序列特异性蛋白质具有高度特异性、高灵敏度和快速等特点, 为转录因子调控机制、开放阅读框识别和功能基因检测等的研究提供了有利工具.

关键词 转录因子 NF-κB 单分子发夹寡核苷酸 阳极溶出法 金纳米粒子

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Electrochemical Detection of Sequence Specific DNA Binding Protein with Gold Nanoparticle-catalized Ag Enhancement

PAN Qin, XU Li-Jian, WANG Zhi-Fei, LU Zu-Hong*, HE Nong-Yue*

State Key Laboratory of Bioelectronics of Ministry of Education, Southeast University, Nanjing 210096, China

Abstract The interactions between transcription factor and sequence specific DNAplay important roles in drug genome and transcription diagnosis. Gold nanoparticlesshow high sensitivity, stability and compatibility for biological molecules as electrochemical intercalators. NF-κB is a family of transcription factors that regulates a wide variety of biological processes such as inflammation, apoptosis, cell cycle control, cell migration and wide variety of cancers. There is no report of sequence specific DNA binding NF-κB detection by gold nanoparticle catalyzed Ag enhancement at the interface between electrodes and electrolyte solutions. Here unimolecular hairpin oligonucleotides were self-assembled onto Au electrode surface and elongation on solid phase was carried out to double strand oligonucleotides with transcription factor NF-κB binding site. The elongation of unimolecular hairpin oligonucleotides on Au electrodes was verified by incorporation of biotin labeled dUTP during the elongation followed by addition of gold nanoparticle labeled streptavidin and detection of anodic stripping voltammetry(ASV) signals of gold nanoparticle-catalyzed Ag deposition. Then gold nanoparticle-catalyzed Ag deposition was detected by ASV for NF-κB binding and the specificity of NF-κB binding and the detection limit were explored. It was resulted the detection low limit was as low as 0.1 pmol/L, which was five magnitude lower than the applied fluorescence method for DNA-protein interactions detection on the aldehyde-coated glass slides. It was indicated that this new method for sequence specific DNA binding protein detection showed pronounced specificity, sensitivity and could find application to transcription regulation research, open reading frame characterization and functional gene inspection.

Key words Transcription factor NF-κB Unimolecular hairpin oligonucleotide Anodic stripping voltammetry Gold nano particle

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通讯作者 何农跃 nyhe@seu.edu.cn