

4th Edition of International Conference on Polymer Science and Technology

June 04-05, 2018 London, UK

Xuemin Zhou et al., Polym Sci 2018, Volume 4 DOI: 10.4172/2471-9935-C2-012

DNA-SILVER NANOCLUSTERS MOLECULAR BEACONS AS A NOVEL Nanoprobe for Sensitive and Label-Free Fluorescent Detection of Transcription Factors

Xuemin Zhou, Bingzhi Li, Lei Xu, Yue Chen, Wanying Zhu, Xin Shen, Chunhong Zhu, Jieping Luo, Xiaoxu Li and Junli Hong

Nanjing Medical University, China

As a fluorescent bio-molecule functionalized nanomaterial, DNA-silver nanoclusters (DNA-AgNCs) has attracted substantial research interest. Whereas, the application of this material is still focused on detecting nucleic acids and developing aptamer-based sensors, where we believe that the application scope of DNA-AgNCs can be further expanded. Transcription factors (TFs) are key regulators in gene expression, and their dysregulation are involved in numerous diseases. Thus, they are therapeutic targets and potential diagnostic markers. However, present methods for TFs detection are either cumbersome or costly. Herein, we firstly applied DNAsilver nanoclusters molecular beacons (AgMBs) in TFs analysis and designed an assay based on the switchable fluorescence of AgMBs. In the absence of TFs, a single-stranded DNA functioned as a reporter is released from a double-stranded DNA probe (referred as dsTFs probe) under exonuclease III (Exo III) digestion. Then, the reporter triggers downstream Exo III-assisted signal amplification by continuously consuming the guanine-rich enhancer sequences in AgMBs, resulting in significant fluorescent decrease eventually. Conversely, the presence of TFs protects the dsTFs probe from digestion and blocks the downstream reaction to keep a highly fluorescent state. To testify this rationale, we utilized nuclear factor-kappa B p50 (NF-κB p50) as a model TFs. Owing to the amplification strategy, this method exhibited high sensitivity towards NF-KB p50 with a limit of detection of 10 pM, and a broad linear range from 30 pM to 1.5 nM. Furthermore, this method could detect multiple TFs in human colon cancer DLD-1 cells and reflect the variation in their cellular levels after stimulation. Finally, by conducting an inhibition assay we revealed the potential of this method for screening TFs-targeted drugs and calculating the IC50 of corresponding inhibitors.



Figure 1: The sensing approach of AgMBs-based TFs assay.

Recent Publications

- 1. Xu L et al. (2017) G-quadruplex based Exo III-assisted signal amplification aptasensor for the colorimetric detection of adenosine. Anal Chim Acta. 980:58-64.
- Zhu W et al. (2016) Magnetically controlled electrochemical sensing membrane based on multifunctional molecularly imprinted polymers for detection of insulin. Electrochim Acta. 218:91-100.
- Han Q et al. (2016) Magnetic sensing film based on Fe3O4@Au-GSH molecularly imprinted polymers for the electrochemical detection of estradiol. Biosens Bioelectron. 79:180-186.

Biography

Xuemin Zhou is a Professor in the School of Pharmacy at Nanjing Medical University, China. Her current research interests include the design and the development of separation method, nanomaterials and electrochemical sensor for the analysis of target molecules in complex matrix.

xueminzhou001_001@hotmail.com