

Author's Accepted Manuscript

A Nonenzymatic DNA Nanomachine for Biomolecular Detection by Target Recycling of Hairpin DNA Cascade Amplification

Jiao Zheng, Ningxing Li, Chunrong Li, Xinxin Wang, Yucheng Liu, Guobin Mao, Xinghu Ji, Zhike He



PII: S0956-5663(18)30066-6
DOI: <https://doi.org/10.1016/j.bios.2018.01.054>
Reference: BIOS10247

To appear in: *Biosensors and Bioelectronic*

Received date: 26 November 2017
Revised date: 22 January 2018
Accepted date: 24 January 2018

Cite this article as: Jiao Zheng, Ningxing Li, Chunrong Li, Xinxin Wang, Yucheng Liu, Guobin Mao, Xinghu Ji and Zhike He, A Nonenzymatic DNA Nanomachine for Biomolecular Detection by Target Recycling of Hairpin DNA Cascade Amplification, *Biosensors and Bioelectronic*, <https://doi.org/10.1016/j.bios.2018.01.054>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A Nonenzymatic DNA Nanomachine for Biomolecular Detection by Target Recycling of Hairpin DNA Cascade Amplification

Jiao Zheng, Ningxing Li, Chunrong Li, Xinxin Wang, Yucheng Liu, Guobin Mao,
Xinghu Ji, Zhike He*

Key Laboratory of Analytical Chemistry for Biology and Medicine (Ministry of Education),
College of Chemistry and Molecular Sciences, Wuhan University, Wuhan 430072, China

Abstract

Synthetic enzyme-free DNA nanomachine performs quasi-mechanical movements in response to external intervention, suggesting the promise of constructing sensitive and specific biosensors. Herein, a smart DNA nanomachine biosensor for biomolecule (such as nucleic acid, thrombin and adenosine) detection is developed by target-assisted enzyme-free hairpin DNA cascade amplifier. The whole DNA nanomachine system is constructed on gold nanoparticle which decorated with hundreds of locked hairpin substrate strands serving as DNA tracks, and the DNA nanomachine could be activated by target molecule toehold-mediated exchange on gold nanoparticle surface, resulted in the fluorescence recovery of fluorophore. The process is repeated so that each copy of the target can open multiplex fluorophore-labeled hairpin substrate strands, resulted in amplification of the fluorescence signal. Compared with the conventional biosensors of catalytic hairpin assembly (CHA) without substrate in solution, the DNA nanomachine could generate 2 to 3 orders of magnitude higher fluorescence signal. Furthermore, the DNA nanomachine could be used for nucleic acid, thrombin and adenosine highly sensitive specific detection based on isothermal, and homogeneous hairpin DNA cascade signal amplification in both buffer and a complicated biomatrix, and this kind of DNA nanomachine could be efficiently applied in the field of biomedical analysis.

Keywords: biomolecule detection, DNA nanomachine, fluorescence, gold nanoparticles, hairpin DNA cascade amplification.

Download English Version:

<https://daneshyari.com/en/article/7229610>

Download Persian Version:

<https://daneshyari.com/article/7229610>

[Daneshyari.com](https://daneshyari.com)