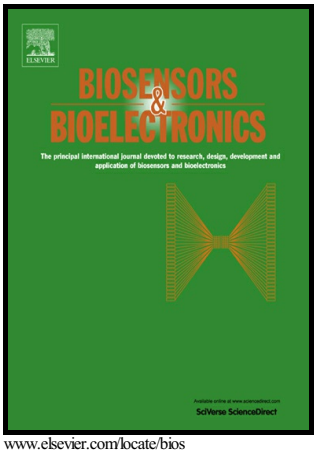

www.elsevier.com/locate/bios

A ratiometric electrochemical biosensor for the exosomal microRNAs detection based on bipedal DNA walkers propelled by locked nucleic acid modified toehold mediate strand displacement reaction

Jing Zhang, Liang-Liang Wang, Mei-Feng Hou, Yao-Kun Xia, Wen-Hui He, An Yan, Yun-Ping Weng, Lu-Peng Zeng, Jing-Hua Chen

PII: S0956-5663(17)30717-0
DOI: https://doi.org/10.1016/j.bios.2017.10.050
Reference: BIOS10075

To appear in: *Biosensors and Bioelectronic*

Received date: 21 September 2017
Revised date: 23 October 2017
Accepted date: 26 October 2017

Cite this article as: Jing Zhang, Liang-Liang Wang, Mei-Feng Hou, Yao-Kun Xia, Wen-Hui He, An Yan, Yun-Ping Weng, Lu-Peng Zeng and Jing-Hua Chen, A ratiometric electrochemical biosensor for the exosomal microRNAs detection based on bipedal DNA walkers propelled by locked nucleic acid modified toehold mediate strand displacement reaction, *Biosensors and Bioelectronic,* https://doi.org/10.1016/j.bios.2017.10.050

A ratiometric electrochemical biosensor for the exosomal microRNAs detection based on bipedal DNA walkers propelled by locked nucleic acid modified toehold mediate strand displacement reaction

Jing Zhang[a], Liang-Liang Wang[b], Mei-Feng Hou[a], Yao-Kun Xia[b], Wen-Hui He[b], An Yan[b], Yun-Ping Weng[b], Lu-Peng Zeng[b], Jing-Hua Chen[b*]

[a]College of Life Sciences, Fujian Agriculture and Forestry University, Fuzhou, Fujian Province 350002, P R China.

[b]Department of Pharmaceutical Analysis, The School of Pharmacy, Fujian Medical University, Fuzhou, Fujian Province 350108, P. R. China.

*Corresponding author. E-mail: cjh_huaxue@126.com (J. H. Chen).

Abstract

Sensitive and selective detection of microRNAs (miRNAs) in cancer cells derived exosomes have attracted rapidly growing interest owing to their potential in diagnostic and prognostic applications. Here, we design a ratiometric electrochemical biosensor based on bipedal DNA walkers for the attomolar detection of exosomal miR-21. In the presence of miR-21, DNA walkers are activated to walk continuously along DNA tracks, resulting in conformational changes as well as considerable increases of the signal ratio produced by target-respond and target-independent reporters. With the signal cascade amplification of DNA walkers, the biosensor exhibits ultrahigh sensitivity with the limit of detection (LOD) down to 67 aM. Furthermore, owing to the background-correcting function of target-independent reporters termed as reference reporters, the biosensor is robust and stable enough to be