

## Supporting Information

### **Affinity-Modulated Molecular Beacons on MoS<sub>2</sub> Nanosheets for MicroRNA Detection**

*Mingshu Xiao<sup>1</sup>, Arun Richard Chandrasekaran<sup>2</sup>, Wei Ji<sup>1</sup>, Fan Li<sup>1</sup>, Tiantian Man<sup>1</sup>, Changfeng Zhu<sup>3</sup>, Xizhong Shen<sup>3</sup>, Hao Pei<sup>1</sup>, Qian Li<sup>4\*</sup> and Li Li<sup>1\*</sup>*

<sup>1</sup>Shanghai Key Laboratory of Green Chemistry and Chemical Processes, School of Chemistry and Molecular Engineering, East China Normal University, 500 Dongchuan Road, Shanghai, 200241, P. R. China

<sup>2</sup>The RNA Institute, University at Albany, State University of New York, Albany, NY 12222, USA

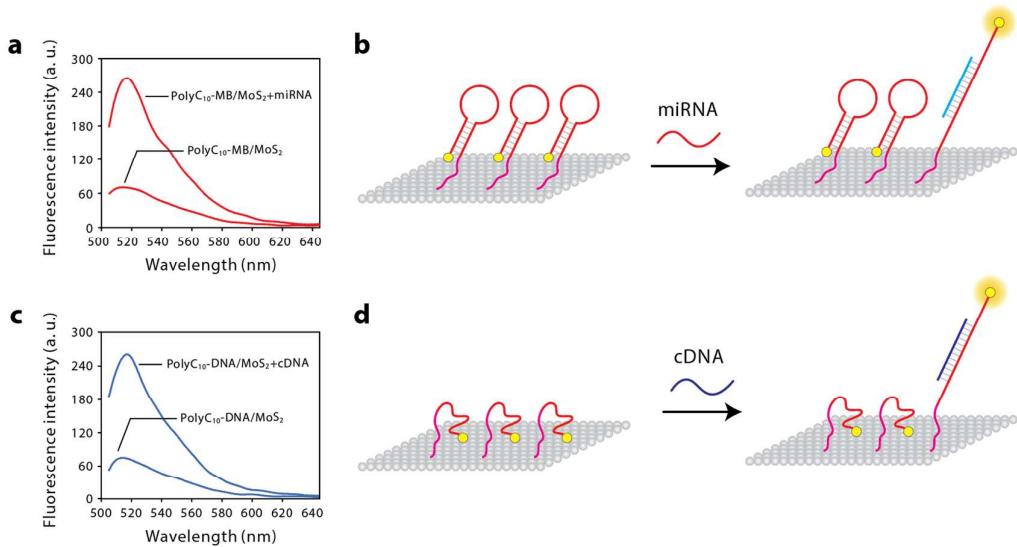
<sup>3</sup>Department of Gastroenterology, Zhongshan Hospital, Fudan University, Shanghai, 200032, P.R China

<sup>4</sup>School of Chemistry and Chemical Engineering, Shanghai Jiao Tong University, Shanghai 200240, China

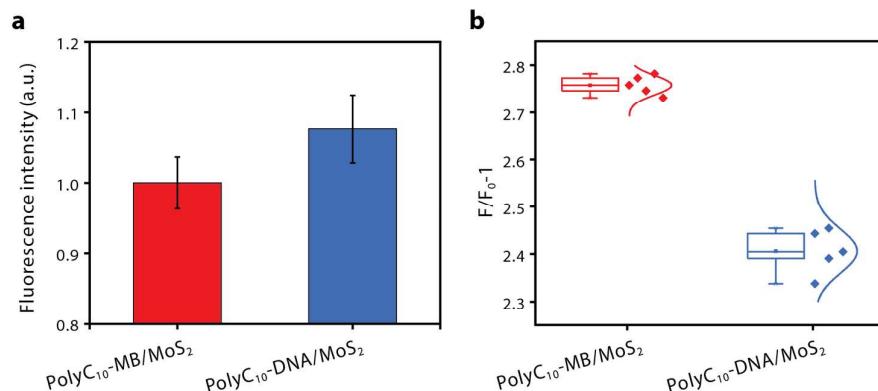
#### **Corresponding Author**

\*E-mail: liqian@sinap.ac.cn; lli@chem.ecnu.edu.cn.

This material includes fluorescence emission spectra of PolyC<sub>10</sub>-MB/MoS<sub>2</sub> in the absence or presence of miRNA (Figure S1), fluorescence intensities and Fluorescence ratio (F/F<sub>0</sub>-1) of PolyC<sub>10</sub>-MB/MoS<sub>2</sub> and PolyC<sub>10</sub>-DNA/MoS<sub>2</sub> (Figure S2), recovery results of miRNA let-7b in human serum (Table S1), and sequences of oligonucleotides used in this work (Table S2).



**Figure S1.** (a) Fluorescence emission spectra of PolyC<sub>10</sub>-MB/MoS<sub>2</sub> in the absence or presence of miRNA. (b) The schematic illustration of the interaction of PolyC<sub>10</sub>-MB/MoS<sub>2</sub> with miRNA. (c) Fluorescence emission spectra of PolyC<sub>10</sub>-DNA/MoS<sub>2</sub> in the absence or presence of cDNA. (d) The schematic illustration of the interaction of PolyC<sub>10</sub>-DNA/MoS<sub>2</sub> with cDNA.



**Figure S2.** (a) Fluorescence intensities and (b) Fluorescence ratio ( $F/F_0 - 1$ ) of PolyC<sub>10</sub>-MB/MoS<sub>2</sub> and PolyC<sub>10</sub>-DNA/MoS<sub>2</sub>.

**Table S1.** Recovery results of miRNA let-7b in human serum.

Sample number	Added (pM)	Recovered (pM) [n=3]	Recovery (%)	RSD (%)
1	0.01	0.011	110	3.5
2	0.05	0.052	104	2.3
3	0.1	0.103	103	2.9
4	1	1.05	105	1.2
5	10	9.86	98.6	3.2

**Table S2.** Sequences of oligonucleotides used in this work.

Name	Sequence (5'-3')	Length (nt)
let-7b	UGAGGUAGUAGGUUGUGUGGUU	22
let-7c	UGAGGUAGUAGGUUGUAUGGUU	22
let-7a	UGAGGUAGUAGGUUGUAUAGUU	22
let-7e	UGAGGUAGGAGGUUGUAUAGU	21
cDNA	TGAGGTAGTAGGTTGTGGTT	22
SNP	TGAGGTAGTAGGTTGTGTCGTT	22
MB	CGAGCTAACACACAAACCTACTACCTCAAGCTCG-FA M	34
PolyC <sub>10</sub> -DNA	CCCCCCCCCCGCTCGAACACACAAACCTACTACCT CAAGCTCG-FAM	44
PolyC <sub>5</sub> -MB	CCCCCGAGCTAACACACAAACCTACTACCTCAAGC TCG-FAM	39
PolyC <sub>10</sub> -MB	CCCCCCCCCCCCGAGCTAACACACAAACCTACTACCT CAAGCTCG-FAM	44
PolyC <sub>15</sub> -MB	CCCCCCCCCCCCCCCCGAGCTAACACACAAACCTAC TACCTCAAGCTCG-FAM	49
PolyC <sub>20</sub> -MB	CCCCCCCCCCCCCCCCCCCCGAGCTAACACACACAA CCTACTACCTCAAGCTCG-FAM	54
PolyC <sub>30</sub> -MB	CCCCCCCCCCCCCCCCCCCCCCCCCCCCGAGCTA ACCACACAACCTACTACCTCAAGCTCG-FAM	64