Electronic Supplementary Material (ESI) for Analyst.


**Supporting Information**

# Logic-signal-based Multiplex Detection of MiRNAs with High Tension Hybridization and Multiple Signal Amplification

Yaqin Tang,[a] Xiao He,[a] Rui Yan,[b] Xingming Liu,[b] Yi Zhao [b *] Tingting Wang, [c *] Hui Chen [a *] and Xuli Feng [a *]

[a]Department of Pharmaceutical Sciences, Chongqing University, Chongqing, 401331, Email: fengxuli@cqu.edu.cn; chenhui0429@cqu.edu.cn

[b]Chongqing University Cancer Hospital, Chongqing Cancer Hospital, Chongqing, 401331, Email: ian.zy@qq.com

[c]Biochemistry and Molecular Biology Laboratory, Experimental Teaching and Management Center, Chongqing Medical University, Chongqing, 401331, Email: wangtt1990@cqmu.edu.cn

## 1. Electrophoresis Analysis for the Formation of Y-DNA

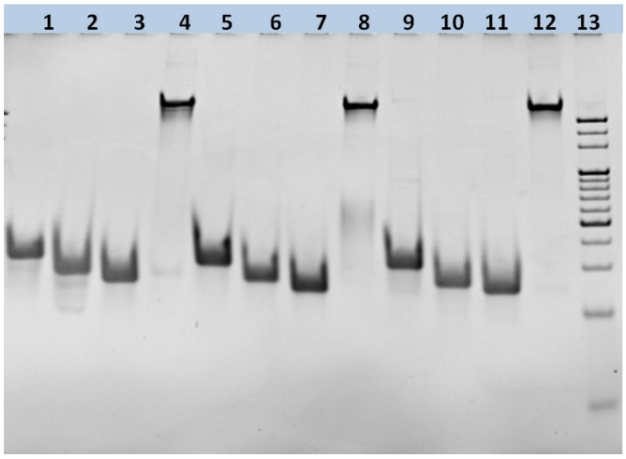


**Figure S1**. Electrophoresis analysis for the formation of Y-DNA. Lane 1: $Y_{1\text{-}210}$, Lane 2: $Y_{2\text{-}210}$, Lane 3: $Y_{3\text{-}210}$, Lane 4: $Y_{210}$-DNA, Lane 5: $Y_{1\text{-}21}$, Lane 6: $Y_{2\text{-}21}$, Lane 7: $Y_{3\text{-}21}$, Lane 8: $Y_{21}$-DNA, Lane 9: $Y_{1\text{-}155}$, Lane 10: $Y_{2\text{-}155}$, Lane 11: $Y_{3\text{-}155}$, Lane 12: $Y_{155}$-DNA, Lane 13: Marker

## 2. Simultaneously Detection of miR-155 and miR-21

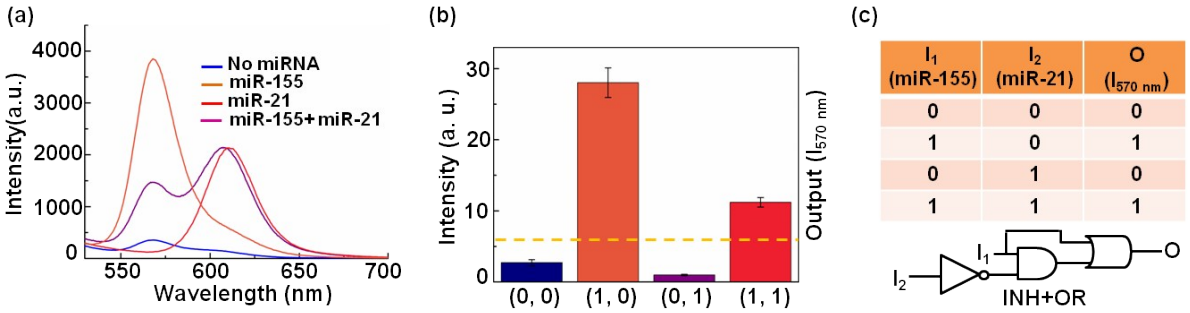


**Figure S2**. (a) Emission spectra before and after the addition of miR-155 and miR-21. (b) Emission intensity of the output at 570 nm from the four input combinations. (d) Logic scheme and truth table of the integrated INH and OR gates. The excitation wavelength is 380 nm.

## 3. Simultaneously Detection of miR-21 and miR-210

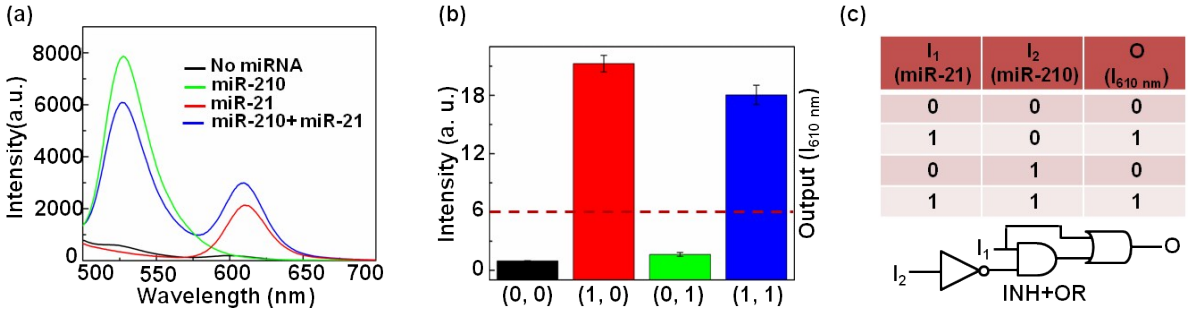


**Figure S3**. (a) Emission spectra before and after the addition of miR-21 and miR-210. (b) Emission intensity of the output at 610 nm from the four input combinations. (d) Logic scheme and truth table of the integrated INH and OR gates. The excitation wavelength is 380 nm.

**4. DNAs and MiRNAs sequences**

1. **$AM_{155}$:** 5'-$NH_2$-GCGAGTACCCCTATCACGATTAGCATTAATTTCGACACTCGC-$NH_2$- 3'
2. **$AM_{210}$:** 5'-$NH_2$-GCGAGTTCAGCCGCTGTCACACGCACAGTTTCGAGACTCGC-$NH_2$- 3'
3. **$AM_{21}$:** 5'-$NH_2$-GCGAGTTCAACATCAGTCTGATAAGCTATTTCGAGACTCGC-$NH_2$- 3'
4. **$17ES_{155}$:** 5'-CATCTCTTCTCCGAGCCGGTCGAAATTAATGCTAATC -3'
5. **$17ES_{210}$:** 5'-TCATCTCTTCTCCGAGCCGGTCGAAACTGTGCGTGTGA-3'
6. **$17ES_{21}$:** 5'-CATCTCTTCTCCGAG CCGGTCGAAATAGCTTATCAGA -3'
7. **$BF\text{-}SS_{155}$:**
8. 5'-Biotin-TTTTTTTTTTTTAATrAGGAAGAGATGTACATAGTAGTG-Cy3-3'
9. **$BF\text{-}SS_{210}$:** 5'-Biotin-TTTTTTTTTTACAGTrAGGAAGAGATGGTTAAAGCTTG-FAM- 3'
10. **$BT\text{-}SS_{21}$:**
    5'-Biotin-TTTTTTTTTTGCTATrAGGAAGAGATGATTGAGTACATG-Tex red-3'
11. **$Y_{1\text{-}155}$:** 5'-GCGAGTCACTACTATGTACATCTCTTCCACTCGCTTGCTGGATCCGCATGACATTCGCCGTAAGT-3'
12. **$Y_{2\text{-}155}$:** 5'-GCGAGTCACTACTATGTACATCTCTTCCACTCGCACTTACGGCGAATGACCGAATCAGCCT-3'
13. **$Y_{3\text{-}155}$:** 5'-GCGAGTCACTACTATGTACATCTCTTCCACTCGCAGGCTGATTCGGTTCATGCGGATCCAGCAA-3'
14. **$Y_{1\text{-}210}$:** 5'-GCGAGTCAAGCTTTAACCATCTCTTCCACTCGCTTGCTGGATCCGCATGACATTCGCCGTAAGT-3'
15. **$Y_{2\text{-}210}$:** 5'-GCGAGTCAAGCTTTAACCATCTCTTCCACTCGCACTTACGGCGAATGACCGAATCAGCCT-3'
16. **$Y_{3\text{-}210}$:** 5'-GCGAGTCAAGCTTTAACCATCTCTTCCACTCGCAGGCTGATTCGGTTCATGCGGATCCAGCAA-3'
17. **$Y_{1\text{-}21}$:** 5'-GCGAGTCATGTACTCAATCATCTCTTCCACTCGCTTGCTGGATCCGCATGACATTCGCCGTAAGT-3'
18. **$Y_{2\text{-}21}$:** 5'-GCGAGTCATGTACTCAATCATCTCTTCCACTCGCACTTACGGCGAATGACCGA

ATCAGCCT-3’

19. **$Y_{3-21}$:** 5’-GCGAGTCATGTACTCAATCATCTCTTCCACTCGCAGGCTGATTCGGTTCATGCGGATCCAGCAA-3’
20. **miR-155:** UUAAUGCUAAUCGUGAUAGGGGU
21. **1-mis-155:** UUAAUGCUAAUCGUGAUAGCGGU
22. **miR-210:** CUGUGCGUGUGACAGCGGCUGA
23. **miR-21:** UAGCUUAUCAGACUGAUGUUGA