

Supplementary Information

A Facile and Label-Free Electrochemical Biosensor for MicroRNA Detection Based on DNA Origami Nanostructures

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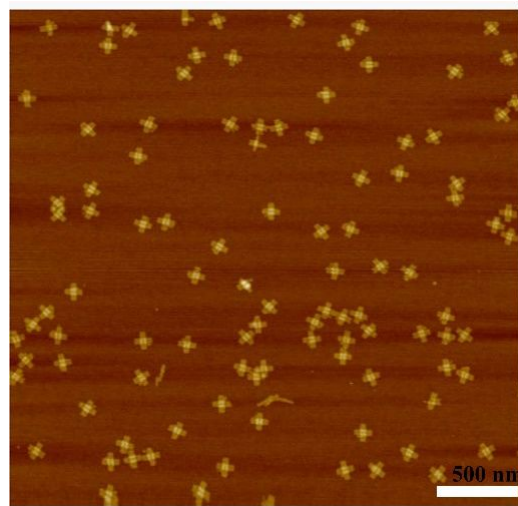


Figure S1. AFM image of the self-assembled cross-shaped DNA origami platform containing ssDNA probes.

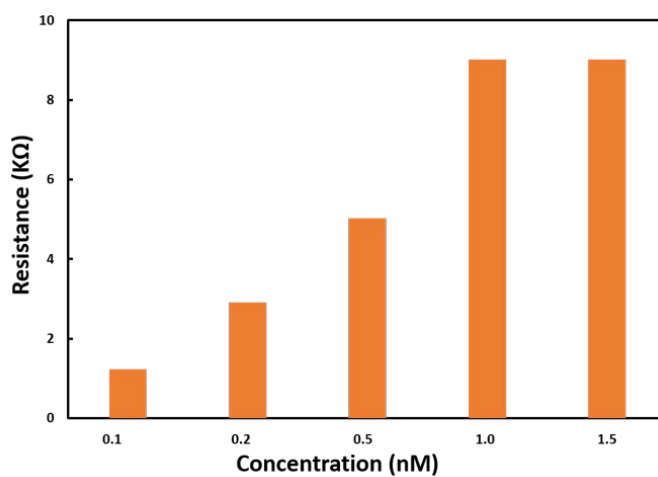


Figure S2. Optimization of the concentration of DNA origami attached on the gold electrode surface (ranging from 0.1, 0.2, 0.5, 1.0 to 1.5 nM). There is no obvious difference of resistance between 1.0 nM and 1.5 nM of DNA origami, therefore, the concentration of DNA origami was 1.0 nM for rest of experiments.

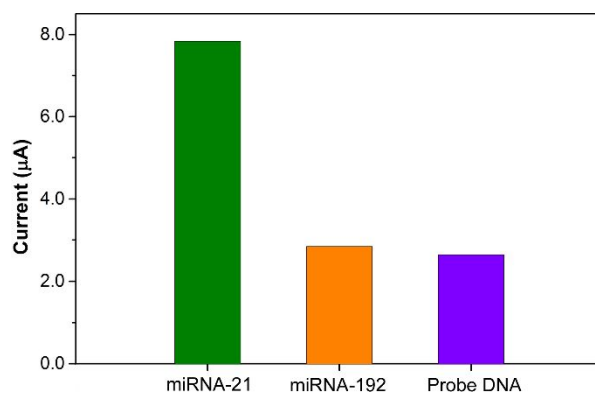


Figure S3. The selectivity of the proposed biosensor for the detection of target and mismatch miRNA. Please note the background noise of DNA origami template containing probe DNA due to the interaction of MB molecules with DNA origami scaffolds.

MiRNA Sequences

miRNA-21 (target)	5'-UAG CUU AUC AGA CUG AUG UUG A-3'
Single-base mismatch on the terminal	5'-UAG CUU AUC AGA CUG AUG UUG C -3'
Single-base mismatch on the middle	5'-UAG CUU AUC G GA CUG AUG UUG A-3'
miRNA-192 (non-complementary)	5'-CUG ACC UAU GAA UUG ACA GCC-3'

Modified ssDNA probes

RC-M27-AS-DNA

TAGCTTATCAGACTGATGTTGATTCCATATTAATTAGACGGGAGAATTACAAAGTTACC

RC-M37-AS-DNA

TAGCTTATCAGACTGATGTTGATTGATTTTTTACAGAGAGAATAACATAAAAAACAG

RC-M49-AS-DNA

TAGCTTATCAGACTGATGTTGATTACCTGAGCAGAGGCCGAATTATTCAGAAAATAG

RC-M57-AS-DNA

TAGCTTATCAGACTGATGTTGATTCAAGAAAAATTGCTTTGAATACCAAGTTACAA

RC-M68-AS-DNA

TAGCTTATCAGACTGATGTTGATTTGATTTGATACATCGGGAGAAACACAACGGAG

RC-M29-AS-DNA

TAGCTTATCAGACTGATGTTGATTAAGCGCCAATTAAGTTGGGTAACGAACATACG

RC-M38-AS-DNA

TAGCTTATCAGACTGATGTTGATTTTGGGAAGCAGCTGGCTAAAGCTAGCTATTTTTGAGAGAT

RC-M50-AS-DNA

TAGCTTATCAGACTGATGTTGATTAGAAGTATAATAGATAATACATTTCTCTTCGC

RC-M58-AS-DNA

TAGCTTATCAGACTGATGTTGATTCTCGTATTGGTGCCTAACAACACTAGAACGAAC

RC-M70-AS-DNA

TAGCTTATCAGACTGATGTTGATTATTTTAAAGGAATTGAGGAAGGTTTGAGGCCG

Unmodified DNA Sequences used in DNA origami nanoplatfom:

RC-M1 AGCTAATGCAGAACGCGCCTGTTTTAATATCC

RC-M2 CATCCTAATTTGAAGCCTTAAATCTTTTATCC

RC-M3 TGAATCTTGAGAGATAACCCACAAAACAATGA

RC-M4 AATAGCAATAGATGGGCGCATCGTACCGTATC

RC-M5 GGCCTCAGCTTGCATGCCTGCAGGGAATTCGT

RC-M6 AATCATGGTGGTTTTTCTTTTCACCCGCCTGG

RC-M7 CCCTGAGAGAGTTGCAGCAAGCGGGTATTGGG

RC-M8 CGCCAGGGTCATAGCTGTTTCCTGGACGGCCA

RC-M9 GTGCCAAGGAAGATCGACATCCAGATAGGTTA

RC-M10 CGTTGGTGTAGCTATCTTACCGAATTGAGCGC

RC-M11 TAATATCAACCTTCGCTAACGAGCCCGACTTG

RC-M12 CGGGAGGTTTTACGAGCATGTAGAACATGTT

RC-M13 CTGTCCAGACGACGACAATAAACAAACCAATC

RC-M14 AATAATCGCGTTTTAGCGAACCTCGTCTTTCC

RC-M15 AGAGCCTACAAAGTCAGAGGGTAAGCCCTTTT

RC-M16 TAAGAAAAGATTGACCGTAATGGGCCAGCTTT

RC-M17 CCGGCACCCACGACGTTGTAAAACGTGAAAT

RC-M18 TGTTATCCGGGAGAGGGCGGTTTGCTCCACGCT

RC-M19 GGTTTGCCCCAGCAGGCGAAAATCAATCGGCC

RC-M20 AACGCGGGCTCACAATTCCACACCCAGGGTT
RC-M21 TTCCAGTGCTTCTGGTGCCGGAAGTGGGAAC
RC-M22 AAACGGCGGTAAGCAGATAGCCGAAACTGAAC
RC-M23 ACCCTGAAATTTGCCAGTTACAAATTCTAAGA
RC-M24 ACGCGAGGGCTGTCTTTCCTTATCAAGTAATT
RC-M25 GTACCGACAAAAGGTAATTCCAAG
RC-M26 AACGGGTAGAAGGCTTATCCGGTAATAAACAG
RC-M28 GTCGGATTCTCCACCAGGCA

RC-M30 AGCCGGAAGCCAGCTGCATTAATGCTGTTTATGATGGTGTCTTTCCTGTAGCCAGCTTTAATCGATG
RC-M31 GCAAAATTCGGGAAACCTGTGCTGCATAAAGTGTAAGCGATGTGCT
RC-M32 GCAAGGCGTTCGCCATTCAGGCTGCGCAACTG
RC-M33 GGAAGCGCTTTATCCCAATCCAAAAGCAAAT
RC-M34 CAGATATATTAACCATACGGAAATTACCCAAAAGAACTGGCATGATTA
RC-M35 AGGCATTTTCGAGCCAGTACTCATCG
RC-M36 AGAACAGTACCGCGCCCAATAGCTAAGAAAC
RC-M39 CCTAATGAACTGCCCGCTTTCAGCCCTTATA
RC-M40 AATCAAAAGAATAGCCCTTTAAATATGCATTCTACTA
RC-M41 GAGATAGGGTTGTCAGGATTAGAGAGTACCTATTCATT
RC-M42 TTGCGCTCGTGAGCTAACTCACATGATAGCCC
RC-M43 TATTACGCGGCGATCGGTGCGGGCGAGGATTT
RC-M44 CAGCCTTTGTTAACGTCAAAAATTTCAATT
RC-M45 GGAATCATCAAGCCGTTTTTATTTGTTATATA
RC-M46 TCGCCATATTTAACAACGTTGCGGGGTTTTAAGCCCAA
RC-M47 CCAACAGTGTGTGCCCGTATAAACAGTTAACCAGAGC
RC-M48 ACTATATGCTCCGGCTTAGGTTGGTCATCGTA
RC-M51 TAAAACATCTTTAATGCGCGAACTTAATTGCG
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RC-M80 ACATAAATACGTGAGATGAATATATGGAAGGA
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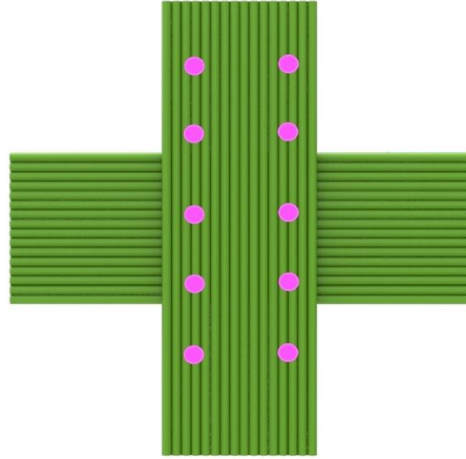
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 RC-M141-AS TCACCAGTAGCCCTCATATGATGAAAGACTACC
 RC-M143-AS CCCTCAGACGCCACCAGAACCACCATGCCCCC
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 RC-M151-AS TAGGAACCTTGTCTTTCCAGACGGTTTATCAGCTTGGCGCTTGCA
 RC-M152-AS CACCACCGGCATTGACAGGAGGTTGCCTTGAGTAACATAATTTAGGCAG

Schematic drawing of the location of ssDNA probes on DNA origami surface

The sequence number of each strand is corresponding to the reference listed below



Reference:

W. Liu, H. Zhong, R. Wang, and N. Seeman, Crystalline two-dimensional DNA origami arrays, *Angew Chem Int Ed Engl*, **2011**, 50, 264-267