Supporting Information

Functional 2D MXene-DNA Hybrid Hydrogel for Portable Detection of Blood Disorder Biomarker Thrombin in Human Plasma

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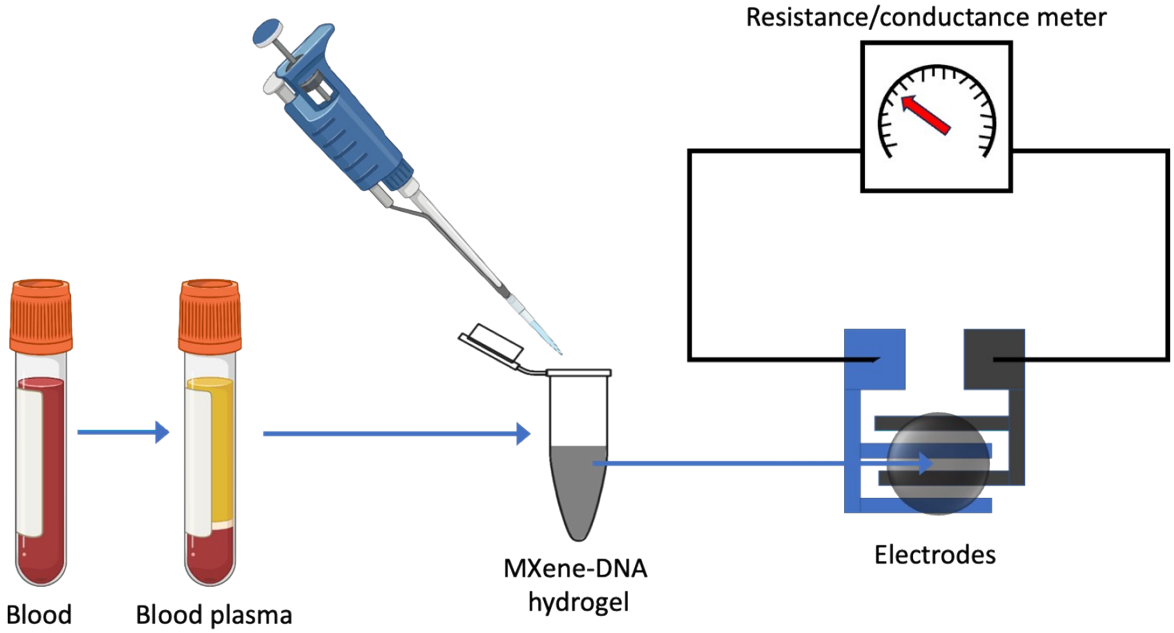
Table S1. Sequence of oligos used in the study.

#	Oligo	Sequence (5'-3')
1	Apt1 (Aptamer for thrombin)	5′- [ThiC6] -ACT GTG GTT GGT GTG GTT GG-3′
2	Apt2 (cDNA for Apt1)	5'- [ThiC6] -ACC AAC CAC AGT-3'
3	Apt3 (Aptamer for Ampicillin)	5′- [ThiC6] -GCG GGC GGT TGT ATA GCG G-3'
4	Apt4 (cDNA for Apt3)	5′- [ThiC6] -CCG CTA TAC AAC -3'



Schematic S1. Depiction of the proposed thrombin detection set-up with MXene-DNA hybrid hydrogel.

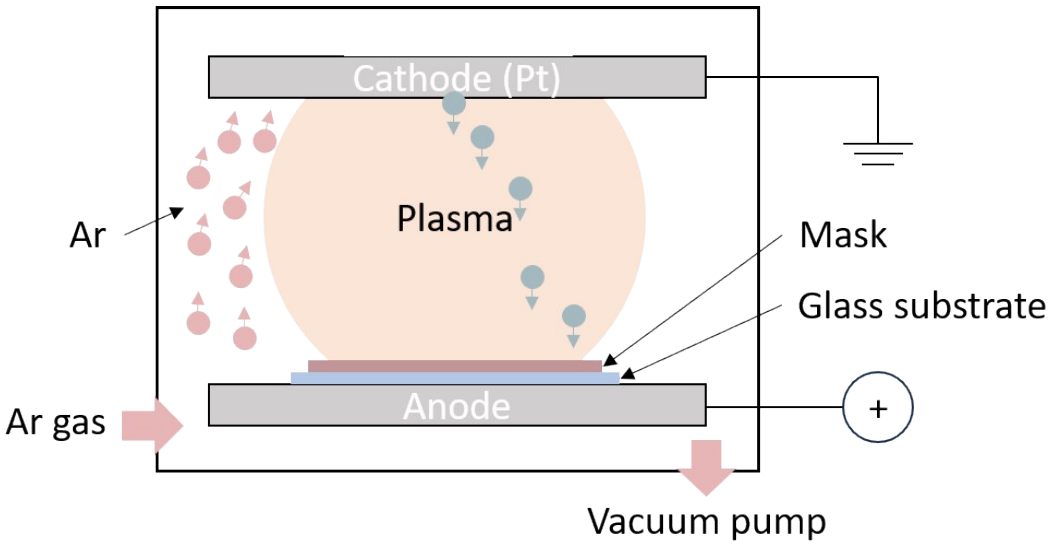
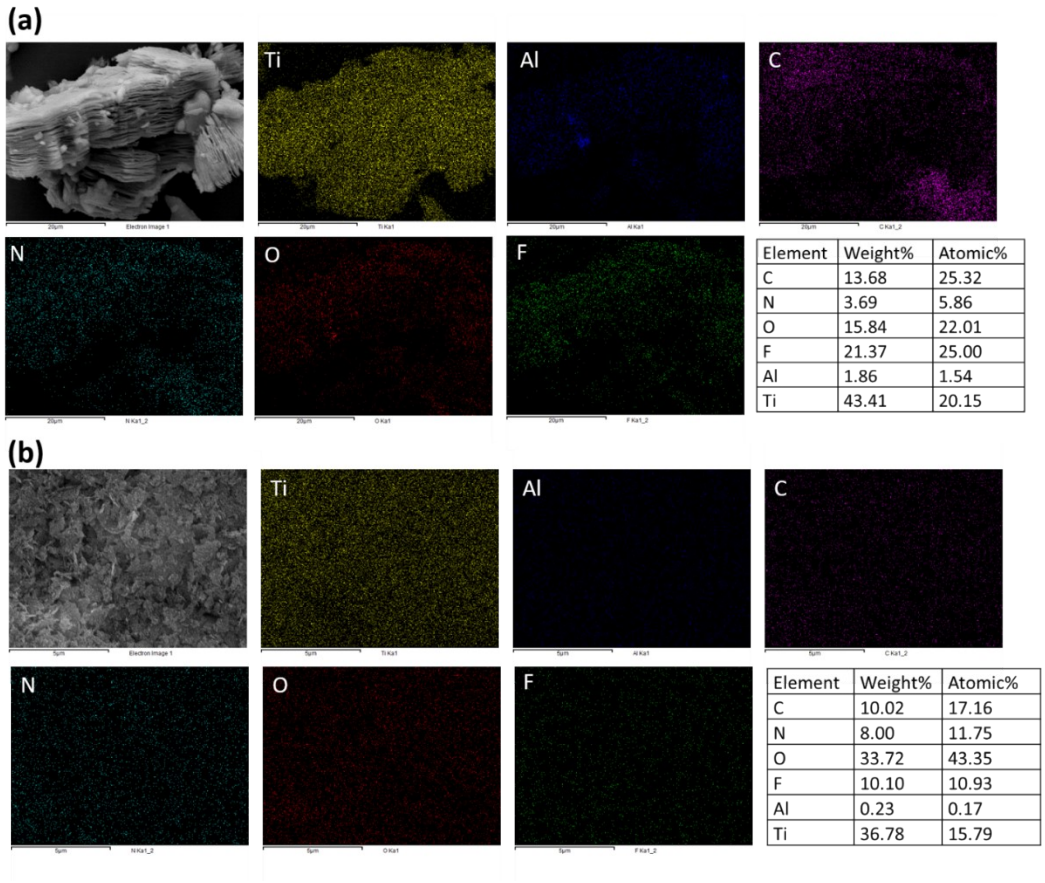


Figure S1. Schematic representation of the setup for sputtering to develop the Pt-printed glass electrode with a mask.



Element	Weight%	Atomic%
C	13.68	25.32
N	3.69	5.86
O	15.84	22.01
F	21.37	25.00
Al	1.86	1.54
Ti	43.41	20.15

Element	Weight%	Atomic%
C	10.02	17.16
N	8.00	11.75
O	33.72	43.35
F	10.10	10.93
Al	0.23	0.17
Ti	36.78	15.79

Figure S2. Energy dispersive x-ray (EDX) elemental mapping of (a) MXene and (b) MXene-DNA complex.

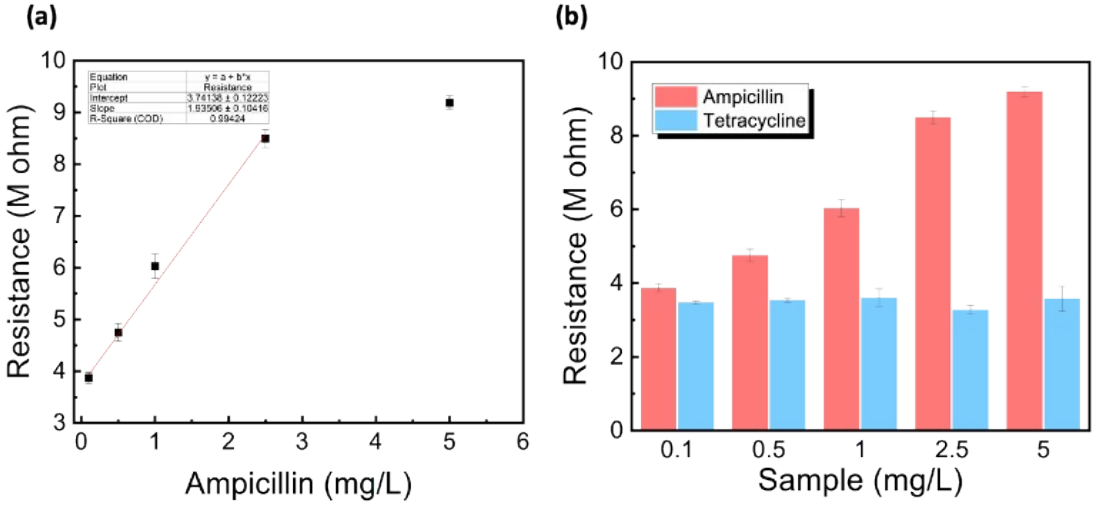


Figure S3. Detection of Ampicillin concentration. (a) Calibration curve from the different concentrations of Ampicillin. (Linear regression fit for initial four points is in red line) (b) A bar graph of the resistance value was observed from different concentrations of Ampicillin and

Tetracycline. The calculated LOD for Ampicillin was 0.1155 mg/L, and the resolution was 0.0597 mg/L.

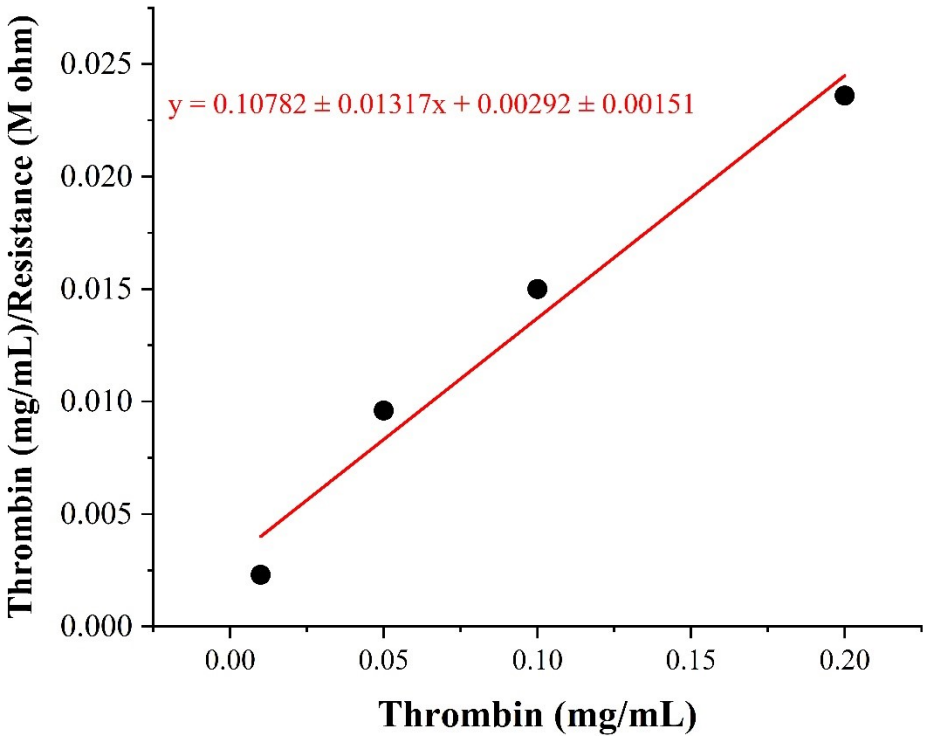


Figure S4: Hanes-Woolf plot between [Thrombin conc.] and [Thrombin conc./change in resistance] for kd value determination.

Table S2: Quantification of thrombin in unknown samples

Sample	Conc. Spiked (mg/L)	Conc. Measured (mg/L)	Recovery (%)	RSD (%)
1	60	68	113.3	8.84

The limit of detection (LOD) and the resolution calculated by the following equations [1].

$$LOD = mulyiplication\ factor\ (3.3)\ \times\ SD_{blank} \quad \text{..... Eq. (S1)}$$

$$SD_{blank} = \sqrt{\frac{\sum(X_i - X_{blank})^2}{N_{blank} - 1}}$$

Where,

X_i is each individual measurement of the blank signal.

$\bar{X}_{blank}$ is the mean of the blank signal.

N_{blank} is the number of measurements in the blank.

$$Resolution = \frac{LOD}{Slope} \quad \text{..... Eq. (S2)}$$

Table S3: Mean and Standard deviation (SD) values for thrombin detection

Thrombin Conc. (mg/L)	Resistivity (MΩ)	Resistivity (MΩ)	Mean	Standard Deviation (SD)
Blank	3.36	3.444	3.402	0.042
10	4.6	4.2	4.4	0.2
50	5.1	5.3	5.2	0.1
100	6.8	6.5	6.65	0.15
200	8.3	8.6	8.45	0.15

Table S4: Mean and Standard deviation (SD) values for Ampicillin detection

Ampicillin Conc. (mg/L)	**Resistivity (MΩ)**	**Resistivity (MΩ)**	**Mean**	**Standard Deviation (SD)**
Blank	2.91	2.98	2.945	0.035
0.1	3.76	3.98	3.87	0.11
0.5	4.58	4.92	4.75	0.17
1	5.8	6.26	6.03	0.23
2.5	8.32	8.67	8.495	0.175
5	9.06	9.32	9.19	0.13

References

1 D. C. Harris, *Quantitative chemical analysis*, Macmillan, 2010.