Supporting Information

MXene-Graphene Field Effect Transistor Sensing of Influenza Virus and SARS-CoV-2

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Note 1. Raman spectrum for monolayer graphene on Cu

Feature Rman peaks of graphene were observed (1580 cm^{-1} for G band and 2683 cm^{-1} for 2D band). The intensity ratio between the 2D band and the G band is ~3, which indicates we have good quality monolayer graphene in our experiments.

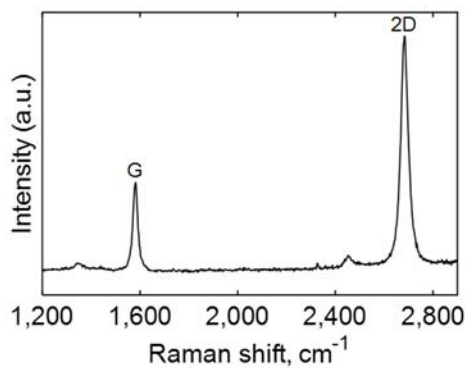

Figure S1. Raman spectrum for monolayer graphene on Cu.

Note 2. CO_2 laser cutting of PDMS

A CO_2 laser was used to cut the microfluidic channel and electrode channels in PDMS. The experiment set up is shown in Figure S2A. To optimize the channel profile, different scan speed (from 2000 to 14000 mm/min), laser power (100 W and 275 W) and laser mode (continuous and pulsed mode) were used and optical images of the cross sections are shown in Figure S2B. Depth results are shown in Table S1. To get a deep and smooth channel, 6000 mm/min scan speed, 275 W and continuous mode were used.

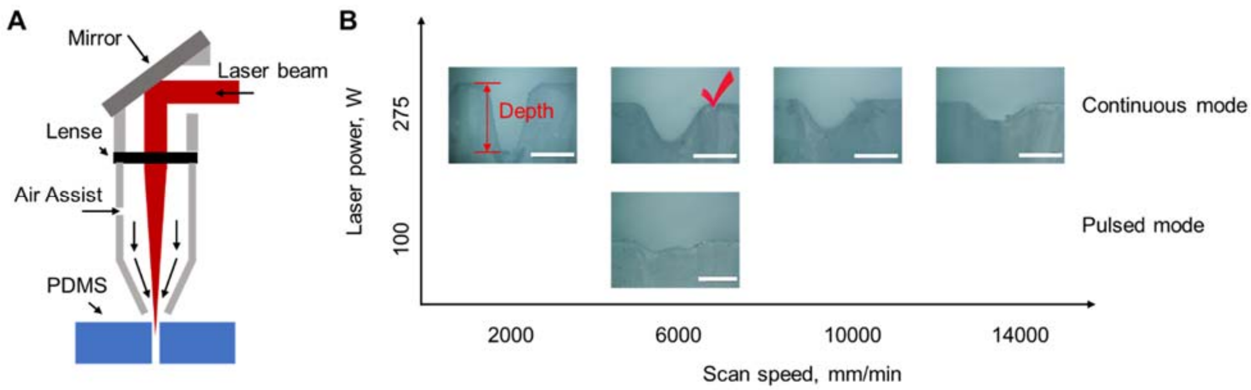

Figure S2. (A) CO_2 laser cutting experimental set up, (B) depth profiles for PDMS channels under different laser cutting parameters. Scale bars denote 1 mm.

Table S1. Channel depth results for different cutting parameters.

Laser mode	Scan speed, mm/min	Depth, mm
Continuous	2000	1.58
	6000	0.89
	10000	0.67
	140000	0.44
Pulsed	6000	0.33

Note 3. PDMS bonding process

Corona treatment, which is an air plasma treatment method, was used for PDMS surface modification. A low temperature corona discharge plasma was used during the process and the treatment time for every sample was 5 minutes. Corona treatment helped form a good bonding between PDMS and MXene-graphene surface, as it decreased the hydrophobicity of PDMS.

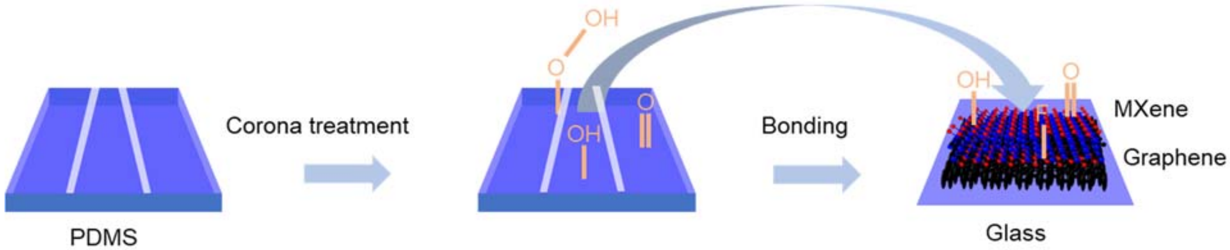

Figure S3. Corona treatment of PDMS surface and bonding to MXene-graphene.