

Graphene Field-Effect Transistor Microarray for Ultrasensitive Virus Detection and Surveillance

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The COVID-19 pandemic underscored the need for fast, sensitive, and scalable diagnostics to track and contain viral outbreaks. Current methods often fall short in cost, speed, and adaptability to emerging pathogens.[1] There is growing demand for biosensors that are low-cost, rapid, reusable, highly sensitive, and independent of prior viral sequence knowledge.

Here, we present a graphene field-effect transistor (GFET) microarray functionalized with engineered human receptors for label-free, antibody-independent detection of intact viruses in complex media.[2] Our platform enables ultrasensitive detection of SARS-CoV-2 virus with attomolar detection limits and selectivity.

This approach combines precise surface chemistry and electronic signal amplification, offering a powerful tool for real-time virus detection. Beyond clinical diagnostics, gFET-based devices offer strong potential for multiplexed, scalable, and early-stage virus surveillance, making them valuable tools in future outbreak preparedness.

References

[1] Manring, N., *et al.*, *Anal. Chem.* 2022, 20 (2022), 7149–7157.

[2] Wetzl, C., *et al.*, *Nanoscale*, 15 (2023), 16650-16657.

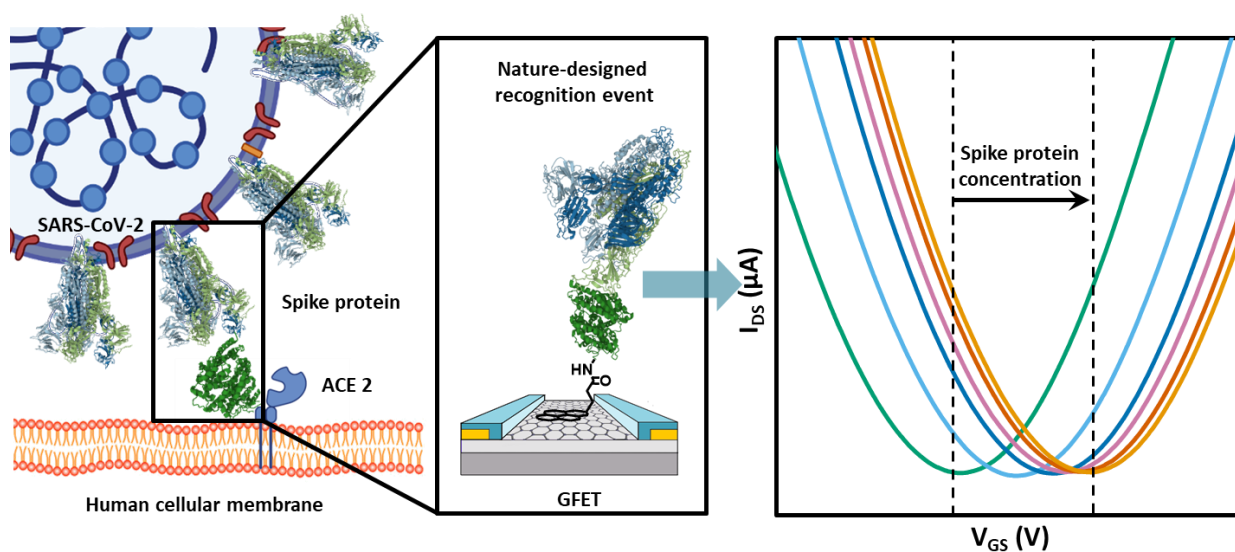


Figure 1: Schematic illustration of virus detection using GFETs, highlighting their sensing performance.