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Layered 2D Functional Materials and Their Integration into a Nuclei Acid Pathogen Detection Device

DNA-functionalized 2D biosensor detects SARS-CoV-2 N gene with high selectivity from saliva or swab samples.

Researchers at Purdue University have developed new biosensors to detect COVID-19 and other bacterial and viral infections. There are currently two primary diagnostic methods to detect COVID-19, RT-PCR and antigen testing. PCR testing, while accurate, is expensive, time-intensive, and requires careful sample handling. Antigen testing is faster but less accurate. The Purdue researchers' biosensors function by measuring electrical resistance of the applied biological fluid on a 2D layer functionalized with DNA primers. In detecting the SARS-CoV-2 N gene, signal was detected at concentrations as low as 100 copies/microliter. The sensor is highly selective to this gene; the sensor shows nearly no response to SARS-CoV and MERS-CoV N genes. Finally, the sensor maintained sensitivity even using saliva samples, which have a lower burden on patient comfortability than nasopharyngeal swabs.

Related Publication: DNA-Functionalized Ti3C2Tx MXenes for Selective and Rapid Detection of SARS-CoV-2 Nucleocapsid Gene. ACS Appl Nano Mater. 2021 Dec 30. DOI: 10.1021/acsanm.1c03520. PMCID: PMC8751632.

Technology Validation: The Purdue researchers' method had high selectivity and sensitivity for SARS-CoV-2 N genes in nasopharyngeal and saliva swabs.

Advantages

- Sensitive

- Selective

- Can detect pathogens with non-invasive method (saliva sample)

- Field-deployable

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Category
Biotechnology & Life Sciences/Cell & Gene Therapy Platforms
Materials Science & Nanotechnology/Nanomaterials & Nanostructures
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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View online

- Point-of-care diagnostic

- Fast detection

Applications

- Biosensor for pathogen detection

TRL: Biotechnology

Intellectual Property:

Provisional-Patent, 2021-10-22, United States

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