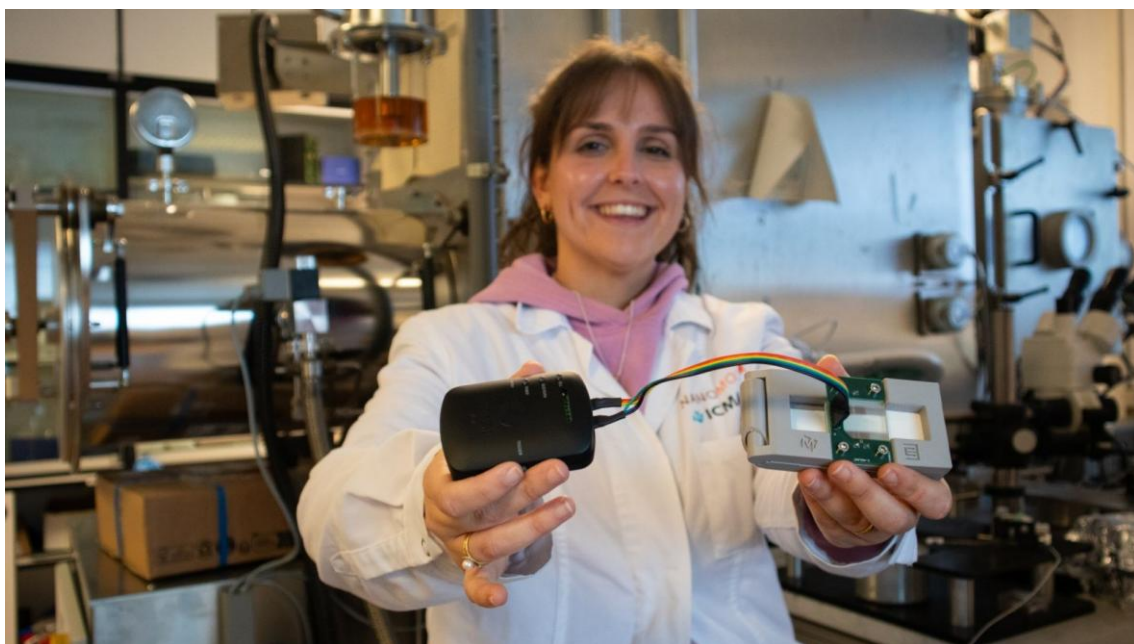




ICMAB researchers create a new test for rapid diagnostics based on paper and organic electronics

Researchers at ICMAB combine paper-based lateral flow technology with organic electronics for achieving a fast, highly sensitive and label-free sensing platform. The study is published in the journal *Advanced Materials*.



María Jesús Ortiz Aguayo showing the rapid test they created | ICMAB-CSIC

A team at the Institute of Materials Science of Barcelona (ICMAB-CSIC) has developed LF-EGOFET, a point-of-care (POC) diagnostic platform that combines the simplicity of lateral flow tests with the precision of laboratory techniques. The innovation enables highly sensitive, label-free detection in just 20–30 minutes, offering a practical solution for point-of-care applications.

The work was carried out by researchers from the [Group of Molecular Materials for Electronic Devices](#) (eMolMat): María Jesús Ortiz-Aguayo, Carme Martínez-Domingo, Diego Gutiérrez, Dean Kos and Marta Mas-Torrent.

“POC diagnostic tests play a crucial role in healthcare by enabling rapid diagnosis and supporting the monitoring of disease progression and treatment effectiveness”, say the research team. “They provide immediate results without relying on centralized laboratory facilities, helping to reduce costs and streamline patient care.”

How current tests work

Lateral flow tests are simple diagnostic tools that use a paper strip to detect the presence of a specific substance in a liquid sample like blood, saliva or urine. Some of the most common uses are pregnancy or COVID-19 tests. They are simple, inexpensive and portable. However, they rely on colour changes visible to the eye, providing only a yes/no answer, and they show a limited sensitivity. Laboratory techniques are more accurate instead, but require complex equipment and long processing times.

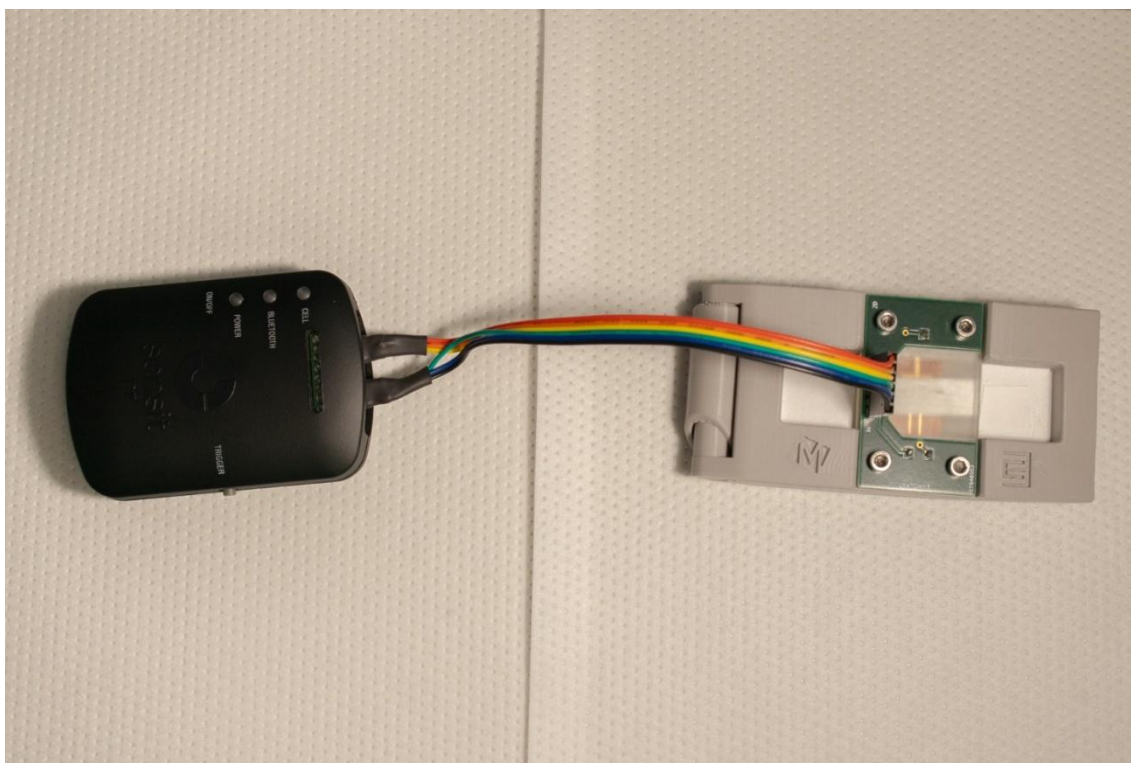


Combining the speed and simplicity of lateral flow tests with the high sensitivity of organic transistors, portable label-free devices that provide more quantitative data have been achieved. This platform holds great potential for rapid diagnosis, health monitoring and timely medical decision-making: “POC tests are especially valuable for controlling the spread of infectious diseases, when rapid clinical decision-making is essential, and in rural or low-resource settings where access to healthcare is limited,” add the authors.

LF-EGOFET, a device that combines simplicity and accuracy

The team has created a new device called LF-EGOFET, a name that combines the lateral flow (LF) devices and the Electrolyte-gated organic field-effect transistors (EGOFETs), devices that are much more sensitive but are not portable.

LF-EGOFET integrates a nitrocellulose strip with an EGOFET. Instead of an optical signal, the test produces an electrical response that can be read with a portable electronic system. Unlike conventional LF tests, this device provides semi-quantitative data. Results can be transmitted digitally, thresholds adjusted for different clinical needs, and even disease severity estimated. The prototype achieved 97% accuracy, outperforming many commercial rapid tests.



The device LF-EGOFET in detail | ICMAB-CSIC

The device was validated in saliva samples, showing strong specificity even in complex biological matrices. Its design allows adaptation to detect different biomarkers by changing the bio-receptor on the strip. Future work will focus on testing real samples and expanding to other biomarkers.

The LF-EGOFET device has already been patented, and the researchers are working to bring it to the market: “There is still much to do, but we are enthusiastic about the technology and are gradually making progress,” authors say.