

# NEW HIGH-PERFORMANCE TRANSISTOR FOR LOW-COST, ENVIRONMENT-FRIENDLY BIOSENSORS DEVELOPED

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

Biosensors, involving fluorescence resonance energy transfer using peptide substrates, glow in different colours during a lab tour | Photo Credit: [Reuters](#)

Researchers have developed new high performance organic field-effect transistors (OFETs) that could be used in low-cost biosensors to measure the levels of pesticides, herbicides, and heavy metals in the soil and groundwater, and also for early detection of plant diseases.

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The team at Shiv Nadar University, Delhi-NCR said that their OFET semiconductor devices could be a game-changer in bio-compatible technology, and prove to be a shot in the arm for sustainable agriculture.

Field-effect transistors form the core of all modern electronics. They use organic semiconductors as the active material for device operation.

The study, published in the journal ACS Applied Electronic Materials, shows the achievement of a significantly high charge-carrier mobility, of up to 20 units, for any organic semiconductor thin film.

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This was achieved through the use of biocompatible salts, which could make these devices significantly more cost-effective as well as environment friendly, according to the researchers.

The resulting biosensors may offer enhanced detection performance with advantages of light-weight, portability, and low cost, which could enable farmers to improve the quality and minimise the loss in their farm produce, they said.

"We believe this is an important breakthrough as the development of indigenous technology will give biosensor technology the much-required edge," said Samarendra Pratap Singh, Associate Professor at Shiv Nadar University, who led the study.

Organic electronics is one of the rapidly emerging fields, which drives many innovative applications impacting several areas ranging from energy-harvesting, storage devices to wearable electronics and biosensors.

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"One of the major applications of this research project is in developing printed flexible electronic biosensors for biological and agricultural purposes," Singh told PTI.

"The mechanical flexibility, low-power consumption, portability, high throughput processing, and

environment-friendly features are major benefits," he added.

The researchers, including Sajal Kumar Ghosh, Associate Professor, and Yogesh Yadav, a PhD student at Shiv Nadar University, noted that the low-cost materials and processing steps of these devices establish OFET based sensors as a low-cost candidate for the desired applications.

However, an estimated cost analysis can be performed after the prototype development of biosensors, they said.

Being lightweight, biocompatible, and printable makes organic semiconductors suitable for a range of products including flexible smart cards, bio-compatible devices, energy harvesting, biosensors, solar cells and more.

"Agriculture is the mainstay of India's economy, and the sector employs nearly half of the country's population. And yet, its contribution to the country's GDP is less than 20 per cent," Rupamanjari Ghosh, Vice-Chancellor, Shiv Nadar University.

"To make the sector more resilient and sustainable is a common goal of research institutions, government, and industry," Ghosh said. This technological breakthrough can help scientists enable better, more creative, and sustainable agri-tech applications to address the problems that farmers in our country face with innovative solutions, she added.

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For the fourth quarter, JPM expects iPhones to bring in revenue of \$46 billion after selling 58 million units, marginally higher than Wall Street's forecast of \$41 billion.

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