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INST pioneers nanomaterial that stimulates brain cells without surgery

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To help in treating brain injuries or manage neurodegenerative diseases



Graphitic carbon nitride has been identified by scientists from Institute of Nano Science and Technology (INST) in Mohali, an autonomous institute of the Department of Science and Technology (DST), that is able to “talk” to neurons naturally. When placed near nerve cells, it generates tiny electric fields in response to the brain’s voltage signals. These fields open calcium channels on neurons, triggering growth and improving connections between cells—without any external device.

This discovery could transform treatment for brain disorders, as scientists have shown that a special nanomaterial called graphitic carbon nitride (g-Câ??Nâ??) can stimulate brain cells—without the need for electrodes, lasers, or magnets.

Normally, treatments such as deep brain stimulation (DBS) require surgical implants, while other methods use magnetic or ultrasound waves to reach brain tissue. These are effective but invasive or limited.

The breakthrough by INST could also impact futuristic technologies such as “brainware computing.” Scientists worldwide are experimenting with brain organoids—tiny lab-grown brain tissues—as biological processors. Coupling them with semiconducting nanomaterials like g-Câ??Nâ?? could make these living computers more efficient, opening new frontiers in bio-inspired computing.

The team at INST pointed out that more preclinical and clinical studies are needed before human applications.

This research will open an avenue towards therapeutic application of semiconductors for tissue engineering purposes which can help in treating brain injuries or manage neurodegenerative diseases such as Alzheimer’s and Parkinson’s disease.