



KAMARAJ IAS ACADEMY
Only IAS Academy by Grandson of "Perunthalsivam Kamarajar"

IIT Bombay Develops India's First Quantum Diamond Microscope to Aid Neuroscience & Materials Research

Published On: 13-11-2025

In November 2025, the researchers from the Photonics and Quantum Engineering(**P-Quest**) Lab at Indian Institute of Technology(**IIT**)-**Bombay**, Mumbai (Maharashtra) developed **India's first Indigenous Quantum Diamond Microscope(QDM)**, marking a milestone in quantum sensing, which earned India its first patent in this domain.

- The development, led by Professor Kasturi Saha, was announced during the Emerging Science Technology and Innovation Conclave (ESTIC 2025) held in New Delhi, Delhi.
- It was developed under the National Quantum Mission(**NQM**) of the Department of Science and Technology (DST), Ministry of Science & Technology(MoS&T).

About India's first Indigenous Quantum Diamond Microscope (QDM):

Dignitaries: Union Minister of State (MoS) Independent Charge (IC) **Dr Jitendra Singh**, MoS&T, Professor Ajay K. Sood, Principal Scientific Adviser(PSA), and Professor Abhay Karandikar, Secretary, DST, were also present at the event.

QDM: It is a quantum sensor-based imaging device that uses Nitrogen Vacancy(**NV**) centres inside a diamond crystal to detect and visualize magnetic fields similar to how an optical microscope images light.

NV Centres: The NV centres are tiny atomic defects in diamond where a nitrogen atom sits next to a missing carbon atom. These defects stay stable even at room temperature and are extremely sensitive to changes in magnetic, electric, and thermal fields.

- Their light emission changes with magnetic signals, which can be measured using Optically Detected Magnetic Resonance (ODMR) method.
- By creating a thin diamond layer with many NV centres, the QDM can capture wide-area images of magnetic activity similar to how an optical microscope captures light images.

3D Nanoscale Magnetic Imaging : The QDM allows wide-field, three-dimensional magnetic field imaging at the nanoscale. It can visualise magnetic fields in 3D, map hidden current paths in multilayer chips, assess materials and devices non-destructively, and even support applications in neuroscience.

Kamaraj IAS Academy

Plot A P.127, AF block, 6 th street, 11th Main Rd, Shanthi Colony, Anna Nagar, Chennai, Tamil Nadu 600040

Phone: **044 4353 9988 / 98403 94477** / Whatsapp : **09710729833**