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IIT-B develops India's first indigenous Quantum Diamond Microscope to help in neuroscience research

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Paving the way for advanced chip diagnostics and biological imaging

Under the National Quantum Mission (NQM) of the Department of Science and Technology (DST), P- Quest Group at the Indian Institute of Technology, Bombay (IIT Bombay) has developed India's first indigenous Quantum Diamond Microscope (QDM) for dynamic magnetic field imaging — a breakthrough that marks a milestone in quantum sensing and has earned India its first patent in this domain.

The QDM which was formally announced on the sidelines of the recently concluded Emerging Science Technology and Innovation Conclave (ESTIC 2025) has promising potential in neuroscience and materials research. It is also poised to transform the non-destructive evaluation of semiconductor chips by mapping magnetic field in 3D layers within an encapsulated chip.

The announcement was made in the presence of Union Minister for Science and Technology, Dr Jitendra Singh; Prof. Ajay K. Sood, Principal Scientific Adviser to the Government of India; Prof. Abhay Karandikar, Secretary Department of Science and Technology, and other officials.

The QDM developed by the PQuest Group, led by Professor Kasturi Saha based on nitrogen-vacancy (NV) centres in diamond, represents a powerful platform for three-dimensional magnetic field imaging at the nanoscale.

With the rise of 3D chip architectures in advanced electronics, cryogenic processors, and autonomous systems, conventional diagnostic tools fall short of visualizing buried current paths and multilayer charge flow. QDM offers a path toward direct, high-resolution 3D magnetic mapping of integrated circuits, batteries, and microelectronic devices.

Aligned with India's National Quantum Mission, Prof. Saha's team aims to develop a quantum imaging platform integrating QDM with AI/ML-based computational imaging, paving the way for advanced chip diagnostics, biological imaging, and geological magnetization studies—all rooted in precise, three-dimensional magnetic field visualisation.