A room temperature quantum sensor

Available Technologies

A new method and system for performing nanoscale spin-based magnetometry

To date, nanoscale quantum sensing of magnetic fields has been largely based on diamond having nitrogen Vacancy (NV) defects.

While NV magnetometry is well established in the few-mT regime, the NV electronic structure restricts the operational range of the system, both in terms of the magnitude of the magnetic field that is detectable and the target field directional sensitivity.

Lab-grown diamonds are costly and slow to grow.

Technology overview

Our researchers developed a new method and system for performing nanoscale spin-based magnetometry.

The sensor consists of atomic scale defects in a layered material. It is incorporated in a device structure that enables detection of weak to moderate magnetic field amplitudes and orientation with nanoscale spatial resolution.

The device can be used to study nanoscale magnetism and or temperature gradients/electric fields in other systems (including for example biological or condensed matter systems).

This device offers improved spatial resolution and a larger dynamic range than the current state of the art (NV-based sensors) due to its 2D nature and

photophysical properties. The device design exploits these advantages to offer an improved quantum sensing platform.

Benefits

- Improved spatial resolution
- Larger dynamic range and vectorial sensitivity
- Cheaper and simpler fabrication

Applications

- Optical Micromanipulation Technology
- Nanoscale magnetometry
- Quantum information processing
- Super-resolution microscopic imaging
- Optical trapping and manipulation
- Optical communication

Image credit: Unsplash