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Omnidirectional Magnetic Field Sensing with Spin Defects in Nanotubes

Nanotube-based spin defects deliver low-cost, resilient omnidirectional magnetic sensing.

One-dimensional nanotubes with optically-active spin defects offer opportunities in quantum sensing, particularly in scanning probe magnetometry. However, a major limitation is that optically detected magnetic resonance has not been achieved with nanotubes before. To address this, researchers at Purdue University have developed a boron nitride nanotube (BNNT) based Omnidirectional magnetic field sensor to measure current distributions or magnetic fields at high resolution. In addition to being significantly more cost effective, Purdue's BNNT based approach also offers greater resilience than expensive and brittle diamond tip alternatives. Applications of this technology include the characterization of material surfaces, magnetic resonance imaging (MRI) of individual molecules.

Advantages

- ~10x lower cost than diamond tip sensors

Applications

-Quantum sensing

-Atomic Force Microscopy

-Sensing magnetic fields and current distributions

-MRI of individual molecules

Technology Validation:

This technology has been validated through use of a BNNT to demonstrate optical detection of magnetic resonance, stray magnetic field sensing, scanning probe magnetometry, and DC magnetic field sensitivity.

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Category
Computing/Internet of Things (IoT)
Computing/Quantum Technologies
Medtech & Digital Health/Medical Image Processing

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