Nanodiamonds as versatile, biocompatible electrochemical sensors

Technology #2858

Nanodiamonds are an imaging material capable of detecting changes in electric and magnetic fields, pH, and ion concentration. Conventional methods for employing nanodiamonds include complex measurement schemes that require long spin coherence time, thereby limiting their overall applicability. This technology is a simple, versatile system for using synthetic nanodiamonds as imaging sensors. In particular, this technology uses photoluminescence rather than spin states as an output, simplifying the system and improving its ability to be used in diverse settings. Development of this technology could result in robust, biocompatible imaging sensors of electrical and ionic fluxes, ion concentration, and pH.

Highly sensitive nanodiamonds for improved detection of electrochemical changes at ambient temperatures in biological systems

This technology utilizes spectral shifts in diamond color centers to detect electrochemical properties. Changes in electric fields across a diamond structure alter the charge state of the color center in a diamond, which in turn leads to a shift in the fluorescence spectrum. Compared to current imaging methods, this technology would require less power while providing fast acquisition to allow for a highly efficient imaging technology. The technology allows for high resolution imaging and provides quantitative measurements of complex systems, making it a promising microscopy technique. This technology cumulatively offers a highly sensitive, quantitative platform for imaging and studying biological systems.

The fabrication, measurement, and characterization of this technology has been carried out in the Englund lab at Columbia University.

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Applications:

• Sensor for nanomedicine
• Biological imaging
• Sensor for monitoring electric fields, magnetic fields, pH and similar properties
• In Vivo imaging for diagnostics or tomography

Advantages:

• Photostable sensor; minimal blinking and bleaching
• Chemically inert and biocompatible
• Highly sensitive probe for imaging and measurement of electrochemical properties
• Can achieve nanometer resolution

Patent Information:

Patent Pending (WO/2013/188651)

Tech Ventures Reference: IR 2858, M11-051, M11-114, CU12035, CU12299

Related Publications:


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