HIGH-PRECISION CHEMICAL QUANTUM SENSING IN FLOWING MONODISPERSE MICRODROPLETS

Tech ID: 33527 / UC Case 2024-119-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Quantum sensing is rapidly reshaping our ability to discern chemical processes with high sensitivity and spatial resolution. Many quantum sensors are based on nitrogen-vacancy (NV) centers in diamond, with nanodiamonds (NDs) providing a promising approach to chemical quantum sensing compared to single crystals for benefits in cost, deployability, and facile integration with the analyte. However, high-precision chemical quantum sensing suffers from large statistical errors from particle heterogeneity, fluorescence fluctuations related to particle orientation, and other unresolved challenges.

To overcome these obstacles, UC Berkeley researchers have developed a novel microfluidic chemical quantum sensing device capable of high-precision, background-free quantum sensing at high-throughput. The microfluidic device solves problems with heterogeneity while simultaneously ensuring close interaction with the analyte. The device further yields exceptional measurement stability, which has been demonstrated over >10^3s measurement and across ~10^5 droplets. Greatly surpassing the stability seen in conventional quantum sensing experiments, these properties are also resistant to experimental variations and temperature shifts. Finally, the required ND sensor volumes are minuscule, costing only about $0.63 for an hour of analysis.

SUGGESTED USES

» High-throughput, high-precision chemical quantum sensing

» Applications from synthesis to bioengineering benefiting from high-resolution discernment of chemical processes

ADVANTAGES

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INVENTORS

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OTHER INFORMATION

CATEGORIZED AS

» **Optics and Photonics**
» All Optics and Photonics
» **Biotechnology**
» Food
» Health
» Industrial/ Energy
» Other
» **Energy**
» Bioenergy
» Other
» **Environment**
» Sensing
» **Engineering**
» Engineering
» Other
» **Materials & Chemicals**
» Biological
» Nanomaterials
» Other
» **Nanotechnology**

» High-sensitivity, background-free measurements

» Measurement stability better than conventional quantum sensing experiments

» High-throughput and cost-competitive, e.g., $0.63/hour of analysis

RELATED MATERIALS

RELATED CASES

2024-119-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Multi-channel ZULF NMR Spectrometer Using Optically Pumped Magnetometers
- High-Speed, High-Memory NMR Spectrometer and Hyperpolarizer

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