SAND2020-11689C

Nuclear Magnetic Resonance of Nano-scale quantum materials detected by Nitrogen vacancies in Diamond

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Nitrogen-Vacancy defect centers (NV) in diamond extend many of the analytical strengths of nuclear magnetic resonance (NMR) to nano- and microscale systems. Quantum materials, such as low dimensional superconductors, semiconductors, 2D Van Der Waals materials each provide unique challenges for integration and measurement with NV diamonds. Here, we present sensitivity optimization for near surface NV ensembles and considerations for target nuclear isotopes. Additionally, we present results on the detection of NMR standards and methodology to integrate novel materials with NV ensemble implanted diamond to provide the optimal SNR for NV detected NMR.

Sandia National Laboratories is a multi-mission laboratory managed and operated by the National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the DOE's National Nuclear Security Administration under Contract No. DE-NA0003525. This work was funded by the Laboratory Directed Research and Development Program and performed, in part, at the Center for Integrated Nanotechnologies, an Office of Science User Facility operated for the U.S. Department of Energy (DOE) Office of Science.