

Abstract Submitted
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High-NV-Density Diamonds for Quantum Sensing KEVIN OLSSON, University of Maryland, College Park, CONNOR HART, Harvard University, JNER TZERN OON, Boston University, NITHYA ARUNKUMAR, MATTHEW TURNER, Harvard University, RONALD WALSWORTH, University of Maryland, College Park — Nitrogen-vacancy (NV) centers in diamond are a prominent platform for developing quantum sensing devices. However, the lack of scalable and reproducible methods for producing high quality NV diamond material has hindered the advancement towards the large scale expansion of NV based sensing devices. We examine diamonds fabricated via a chemical vapor deposition process that have reproducible, favorable properties, including dense NV concentrations ($\approx 3\text{ppm}$) and minimal parasitic defects. We measure the volume normalized sensitivity to DC and AC magnetic fields in these samples where both nitrogen-NV and NV-NV interactions limit spin dephasing and decoherence times. Finally, we explore advanced readout techniques to further improve the ultimate sensitivity of this diamond material.

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