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Optimization of NV-Diamond for Ensemble Sensing Applications

LINH PHAM, MIT Lincoln Laboratory, SCOTT ALSID, MIT/Lincoln Laboratory, PAOLA CAPPELLARO, MIT, DANIELLE BRAJE, MIT Lincoln Laboratory — The nitrogen-vacancy (NV) center in diamond is a promising spin system for a number of quantum sensing applications; in recent years, NV centers have been employed to measure temperature, electric field, and magnetic field. In bulk diamond sensors, which take advantage of probing an ensemble of NV centers for improved measurement sensitivity, the sensitivity may be further enhanced by increasing the concentration of NV centers through electron irradiation and annealing. We study the effects of a range of electron irradiation dosages and annealing recipes on the conversion of native substitutional nitrogen defects to negatively-charged NV centers and on NV spin coherence properties such as T_2^* and T_2 , in order to optimize NV properties in bulk diamond for a range of quantum sensing applications.

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