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Spin-based characterization of material properties of diamond samples for high-sensitivity NV magnetometry DIANA PRADO LOPES AUDE CRAIK, ANDREW GREENSPON, JENNIFER SCHLOSS, CONNOR HART, ERIK BAUCH, PAULI KEHAYIAS, XINGYU ZHANG, PATRICK SCHEIDEGGER, MATTHEW TURNER, EVELYN HU, RONALD WALSWORTH, Harvard University — Using optical spectroscopy and spin-manipulation techniques, we characterize the nitrogen concentration and charge-state ratio of nitrogen-vacancy (NV) defects in a collection of diamond samples. We use the data both to calibrate a purely spin-based measurement toolbox for characterizing spin concentrations in diamond and to identify ways of optimizing parameters in diamond growth and processing in order to produce samples with a high concentration of negatively-charged NV defects, for use in high-sensitivity NV-ensemble-based magnetometry.

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