Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

High-frequency EPR of surface impurities on nanodiamond[1] ZAILI PENG, VIKTOR STEPANOV , Department of Chemistry, University of Southern California, SUSUMU TAKAHASHI, Department of Chemistry, University of Southern California; Department of PhysicsAstronomy, University of Southern California — Diamond is a fascinating material, hosting nitrogen-vacancy (NV) defect centers with unique magnetic and optical properties. There have been many reports that suggest the existence of paramagnetic impurities near surface of various kinds of diamonds. Electron paramagnetic resonance (EPR) investigation of mechanically crushed nanodiamonds (NDs) as well as detonation NDs revealed g$\sim$2 like signals that are attributed to structural defects and dangling bonds near the diamond surface. In this presentation, we investigate paramagnetic impurities in various sizes of NDs using high-frequency (HF) continuous wave (cw) and pulsed EPR spectroscopy [1]. Strong size dependence on the linewidth of HF cw EPR spectra reveals the existence of paramagnetic impurities in the vicinity of the diamond surface. We also study the size dependence of the spin-lattice and spin-spin relaxation times (T_1 and T_2) of single substitutional nitrogen defects in NDs Significant deviations from the temperature dependence of the phonon-assisted T_1 process were observed in the ND samples, and were attributed to the contribution from the surface impurities. [1] F.H.Cho, V.Stepanov, R. D. Akiel, X. Zhang, andS. Takahashi, submitted (2016).

[1]This work was supported by the Searle Scholars Program and the National Science Foundation (DMR-1508661 and CHE-1611134).

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Date submitted: 10 Nov 2016 Electronic form version 1.4