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Magnetic Defects in Graphene Quantum Dots SRINIVASA RAO SINGAMANENI, North Carolina State University, JOHAN VAN TOL, National High Magnetic Field Laboratory, Florida State University, 1800 E. Paul Dirac Drive, Tallahassee, Florida 32310, USA, RUQUAN YE, JAMES M. TOUR, Department of Chemistry, Department of Mechanical Engineering and Materials Science, 6Smalley Institute for Nanoscale Science and Technology, Rice U — Spin-coherence time in graphene quantum dots (GQDs), which are highly sought-after spintronics materials is controlled by defects. To that end, exploring the nature of (spin) defect centers in these GQDs is important. Electron spin resonance (ESR) spectroscopy is an ideal local probe to investigate the spin properties of GQDs. ESR investigations are carried out on GQDs [1] as a function of temperature (6-290 K) at two distinct microwave high frequencies 239.2 and 336 GHz. The ESR signal does not show power dependence at 239.2 GHz, 6K, could be adequately described with three distinct components using Lorentzian line shape. From the experimental findings together with computer-aided simulations, we have identified them as one broad (700 Gauss) and narrow (60 Gauss) carbon-centered paramagnetic defect centers and the third one as Mn^{2+} signal, which is an extrinsic impurity. The temperature dependence of carbon-derived spin centers in GQDs resembles to that of conduction electrons, in contrast to the localized spins observed by us earlier [2-5] in graphene nanoribbons.

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