

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

ESR and Microwave Absorption in Boron Doped Diamond Single Crystals¹ CHRISTOPHER TIMMS, Univ of Texas - Dallas, ALAN G. MACDIARMID NANOTECH INSTITUTE AT THE UNIVERSITY OF TEXAS AT DALLAS TEAM² — Superconductivity has been reportedly found in boron-doped diamond. Most research to date has only studied superconductivity in polycrystalline and thin film boron-diamonds, as opposed to a single crystal. In fact, only one other group has examined a macro scale boron-doped diamond crystal. Our group has successfully grown large single crystals by using the High Temperature High Pressure method (HTHP) and observed a transition to metallic and superconducting states for high B concentrations. For the present, we are studying BDD crystal using Electron Spin Resonance. We conducted our ESR analysis over a range of temperatures (2K to 300K) and found several types of signals, proving the existence of charge carriers with spin 1/2 in BDD. Moreover, we have found that with increasing B concentrations, from $n \sim 10^{18} \text{ cm}^{-3}$ to n of over 10^{20} cm^{-3} , the ESR signal changes from that of localized spins to the Dysonian shape of free carriers. The low magnetic field microwave absorption has also been studied in BDD samples at various B concentrations and the clear transition to superconducting state has been found below T_c that ranges from 2K to 4 K depending on concentration and quality of crystal.

¹Sergey Polyakov, Victor Denisov, Vladimir Blank, Ray Baughman, Anvar Zakhidov

²My advisor's name is Dr. Anvar Zakhidov

Christopher Timms
Univ of Texas - Dallas

Date submitted: 14 Nov 2014

Electronic form version 1.4