Abstract Submitted
for the TSF16 Meeting of
The American Physical Society

Boron-Doped Diamond Signal Processing JOHN CIUBUC, Department of Physics, Biomedical Engineering, University of Texas at El Paso, KENDALL LEE, KIP LUDWIG, Department of Neurologic Surgery, Mayo Clinic, JONATHAN TOMSHINE, Division of Engineering, Mayo Clinic, SHINHO CHO, Department of Neurologic Surgery, Mayo Clinic, JOSH JACOBS, SETH HARA, Division of Engineering, Mayo Clinic, FELICIA MANCIU, Department of Physics, Border Biomedical Research Center, University of Texas at El Paso, KEVIN BENNET, Division of Engineering, Department of Neurologic Surgery, Mayo Clinic, MAYO CLINIC, ROCHESTER, MN TEAM, UNIVERSITY OF TEXAS AT EL PASO, EL PASO, TX TEAM — Recent advances in closed loop deep brain stimulation (DBS) technologies lean in favor of enhanced sensitivity and increased stimulation electrode detection limits. There are two primary methods of improvement: hardware and software. This work focuses on the software approach for increasing the sensitivity of the electrodes. The signal processing technique employed consists of three primary approaches: background subtraction, noise reduction, and analyte specification. Background subtraction is used to maximize the signal-to-noise ratio without degrading the signal in the process. Noise reduction is then applied to clean the resulting voltammogram series, further enhancing the signal response for the analyte. Lastly, analyte specification is applied allowing the algorithm to isolate and extract as much of the processed signal as possible. The final result is an order of magnitude increase in the limit of detection for fast scan cyclic voltammetry deep brain stimulation electrodes.

John Ciubuc
Department of Physics, Biomedical Engineering, University of Texas at El Paso

Date submitted: 22 Sep 2016 Electronic form version 1.4