Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Electron paramagnetic resonance of a donor in aluminum nitride crystals. SEAN EVANS, West Virginia University, NANCY GILES, LARRY HALLIBURTON, GLEN SLACK, Crystal IS, SANDRA SCHUJMAN, LEO SCHOWALTER — Electron paramagnetic resonance (EPR) and electron-nuclear double resonance (ENDOR) have been used to characterize a dominant donor in single crystals of aluminum nitride (AlN). A broad EPR signal, with g (parallel) = 2.002 and g (perpendicular) = 2.006, is observed in the as-grown crystals. Exposure to x-rays (i.e., ionizing radiation) increases the concentration of this center by a factor of five to ten (depending on sample), thus indicating that most of these centers are initially present in the crystals in a nonparamagnetic charge state. ENDOR identifies a strong hyperfine interaction with one aluminum neighbor along the c axis (described by A (parallel) = 111.30 MHz, A (perpendicular) = 54.19 MHz, and P = 0.289 MHz) and weaker equivalent hyperfine interactions with three additional aluminum neighbors in the basal plane. These aluminum interactions indicate that the responsible center is a deep donor at a nitrogen site. The observed paramagnetic defect is either a neutral oxygen substituting for nitrogen or a neutral nitrogen vacancy. This work was supported at West Virginia University by the National Science Foundation (Grant DMR-0508140). One of the authors (SME) received support from the WV EPSCoR STEM fellowship program.

Sean Evans
West Virginia University

Date submitted: 30 Nov 2005 Electronic form version 1.4