Abstract Submitted
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Hall Effect Calibration of Silicon Doped GaAs Grown by Molecular Beam Epitaxy (MBE[1] JOSEPH SPINUZZI, Department of Physics, Boise State University, ROBIN MCCOWN, CHRISTOPHER SCHUCK, Micron School of Materials Science Engineering, Boise State University, CARLOS PERDOMO, Autonomous University of Zacatecas, PAUL SIMMONDS, Micron School of Materials Science Engineering, Department of Physics, Boise State University — Calibration of equipment is paramount for any system to ensure quality and control over the properties of a material. A molecular beam epitaxy (MBE) system needs careful calibration to ensure accuracy in the properties of the semiconductor materials it makes. Specifically, we need to precisely control our semiconductor's carrier type (electron or hole), carrier density, and carrier mobility. Hall measurement is one of several experimental techniques used to study a material's electronic properties, and in this study, we utilized the Van der Pauw method to take those measurements. We investigated several thin gallium arsenide (GaAs) films doped with different concentrations of silicon, and epitaxially grown on GaAs (001) substrates. The samples were all tested at room temperature with a 0.545 T magnet, which revealed a linear Arrhenius relationship between the electron concentration and the temperature of the silicon source used to dope the sample. From this plot, a confident determination of specific electron concentration in future GaAs samples can be prescribed and grown by MBE.

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