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Two-probe Electrical and Thermal Transport Measurements on 50-micron Long Single Crystal $ZnGeN_2$ Rods[1] JOHN R. COLVIN, Department of Physics, John Carroll University, PAUL C. QUAYLE, KATHLEEN KASH, Department of Physics, Case Western Reserve University, JEFFREY S. DYCK, Department of Physics, John Carroll University — While many modern electrical devices are based on III-nitride semiconductors such as GaN, these devices have some challenges related to the strong polarity of the wurtzite crystal structure and a difficulty in doping them p-type. $ZnGeN_2$ is a II-IV-nitride analog to GaN, and the two share very similar crystal structures, lattice parameters, and band-gap energies. $ZnGeN_2$ has a number of distinctly different predicted properties, however; in particular, its doping and defect properties and lower spontaneous polarization coefficients. So far, the electrical transport properties of $ZnGeN_2$ are not well studied. Recently, high quality, 50-micron long single crystal rods have been grown by a vapor-liquid-solid method. Electrical transport measurements are difficult on such small crystals. In this work, we will present a novel sample stage designed to perform 2-probe electrical measurements under the influence of a temperature gradient on these small crystals, enabling measurements of Seebeck coefficient and resistance. We will discuss modeling of Seebeck coefficient data for $ZnGeN_2$ and the design, fabrication, and performance of sample stage prototypes.

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