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Electrical behaviors of high purity germanium crystals at low temperature GANG YANG, Univ of South Dakota, KYLER TERON KOOI, GUOJIAN WANG, HAO MEI, University of South Dakota, DONGMING MEI, Univ of South Dakota — The electric behaviors of high purity germanium (HPGe) crystals at low temperature play an important role in determining the purity level of such materials used to fabricate radiation detectors. In the present work, the temperature dependence of electrical properties has been measured for the temperature range from 4.2^oK to 100^oK in two types of HPGe samples, polycrystalline crystals and single crystals, containing different impurity concentrations. The conductivity versus the inverted temperature curves for all of samples was divided into three distinctive temperature ranges: (a) high temperature where the conductivity increased to a maximum with decreasing temperature, (b) intermedium temperature where the conductivity decreased proportionally with decreasing temperature, and (c) low temperature where the conductivity continued decreasing slowly with decreasing temperature. It was also found that there was a turning point on the conductivity vs temperature curves for both types of samples. However, the turning points for them were significantly different: 30K for single crystal samples while 60K for polycrystalline samples. We report our measurements in this paper. We acknowledge financial support from DOE EPSCor Program and the state of the South Dakota governor's research center.

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