

Schottky Barrier Height Measurement of Metal / Ge(111) Diodes

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For several decades, metal-semiconductor Schottky barrier formation has been a very important topic in semiconductor physics, spurred by the phenomenal growth of semiconductor device industries. However, for Ge, few Schottky barrier data exist, and the reported Schottky barrier height (SBH) values of metal/n-Ge and metal/p-Ge diodes do not add up to the band gap value of Ge. In this work, we report new SBH measurements of metals on Ge(111). Metals with various electronegativities (Mg, Al, In, Pb, Sn, Cu, Ag, Pd, and Au) were deposited on both n- and p-Ge(111). Surprisingly, the barrier height measurements show that the n-type SBHs vary from $<0.1\text{eV}$ to 0.56eV ; the “S-factor” was determined to be ~ 0.5 , which is much larger than the reported value for Si. Furthermore, the n- and p-type barrier heights consistently add up to the value of the Ge band gap (0.66eV), except those of Al.

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