FIELD ELECTRON EMISSION SPECTROSCOPY OF SILICON CARBIDE

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ABSTRACT

Goal of this study is measuring field electron energy distribution (FEED) of monocrystal silicon carbide. Lately there have been a lot of research focusing on emission properties of this promising material [1−4]. Nevertheless, published results of FEED measurements of SiC polytypes seem to be curiously absent from literature. In this study FEED measurements have been performed by the retarding potential method [5] from the top of monocrystal specimens, made by the sublimation method, N doped (n-type) on 4° off 4H-SiC wafers (0001-C). A peculiar feature, revealed from the FEED patterns is the existence of two maxima. First results have provided cathode currents between 0.002 and 1 microamps. The shape of the energy spectra suggests that electron emission is strong from conduction band and weak from an area below the conduction band. While 4H-SiC has the largest bandgap of all of the polytypes of crystalline SiC, and the lowest work function for n-type material, its robustness during emission from field emitters arrays (FEAs) [1, 3, 7] is believed due to the monolithic nature of the structures without material interfaces acting as potential failure points, as authors in [7] reports strong and stable field emission properties of monolithic 4H-SiC pillar FEA in diode configuration.
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