

Thermal annealing behaviour of platinum, nickel and titanium Schottky barrier diodes on n-Ge (1 0 0)

A.Chawandaa; C.Nyamhere; F.D.Auret; W.Mtangi; M.Diale; J.M.Nel

Abstract

Platinum (Pt) and titanium (Ti) Schottky barrier diodes were fabricated on bulk grown (1 0 0) Sb-doped n-type germanium using the electron beam whereas nickel (Ni) contacts were fabricated using the resistive evaporation system. Electrical characterization of these contacts using current–voltage (I–V) measurements was performed under various annealing conditions. The variation of the electrical properties of these Schottky diodes can be attributed to combined effects of interfacial reaction and phase transformation during the annealing process. The results have also revealed that Pt Schottky contacts are of a high quality, with low reverse currents in the order of (10⁻⁵ to 10⁻⁶) A and as-deposited ideality factors as low as 1.09. Furthermore, the samples microstructural characterization was performed by scanning electron microscopy (SEM) at different annealing temperatures. From the results, it can be concluded that the onset temperature in 30 nm Ni- and Pt/n-Ge (1 0 0) systems occurs at 500–600 °C and 600–700 °C, respectively.