Thermal stability study of palladium and cobalt Schottky contacts on n-Ge (1 0 0) and defects introduced during contacts fabrication and annealing process

A.Chawanda; C. Nyamhere; F.D.Auret W.Mtangi; T.T. Hlatshwayo; M.Diale; J.M. Nel

Abstract

Palladium (Pd) and cobalt (Co) Schottky barrier diodes were fabricated on n-Ge (1 0 0). The Pd-Schottky contacts were deposited by resistive evaporation while the Co-contacts were deposited by resistive evaporation and electron beam deposition. Current–voltage (I–V), capacitance–voltage (C–V) and deep level transient spectroscopy (DLTS) measurements were performed on as-deposited and annealed samples. Electrical properties of Pd and Co samples annealed between 30 and 600 °C indicate the formation of one phase of palladium germanide and two phases of cobalt germanide. No defects were observed for the resistively evaporated as-deposited Pd- and Co-Schottky contacts. A hole trap at 0.33 eV above the valence band was observed on the Pd-Schottky contacts after annealing at 300 °C. An electron trap at 0.37 eV below the conduction band and a hole trap at 0.29 eV above the valence band was observed on as-deposited Co-electron beam deposited Schottky contacts. Rutherford back scattering (RBS) technique was also used to characterise the Co–Ge, for as-deposited and annealed samples.