

Impedance spectroscopy study of dilute nitride p-i-n diode with multiple quantum wells

ABSTRACT

Dilute nitride p-i-n diode with ten multiple quantum wells (MQWs) were grown using molecular beam epitaxy (MBE) to investigate the capacitance properties under reverse bias voltages. The conventional capacitance-voltage (C-V) profiling technique is very useful for a bulk system but challenging for a system with multiple quantum wells. Impedance spectroscopy analysis is advantageous for quantum wells because it can discriminate between layers. Equivalent circuit parameters extracted from impedance spectroscopy analysis reveal that capacitance at a bias voltage of -1.0 V exhibits the highest capacitance value of 239 μF compared to other bias voltages. The p-in diode charge storage ability is at its highest at this voltage.