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Linear i-v characteristics of highly-doped soi p-i-n diode for low temperature measurement

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Abstrak

This report is focused on the linear region of I-V characteristics of nanoscale highly-doped p-i-n diodes fabricated within ultrathin silicon-on-insulator (SOI) structures with an intrinsic layer length of 200 nm and 700 nm under a forward bias at a temperature range from 50 K to 250 K. The doping concentrations of Boron and Phosphorus in SOI p-i-n diodes are high, 1×1020 cm-3 and 2×1020 cm-3, respectively. The linearity of I-V characteristics of the p-i-n diodes under a certain forward bias voltage range and temperature range from 50 K to 250 K indicate these devices are suitable for low temperature sensing purposes. We conclude that highly-doped p-i-n diodes produce a higher current as the temperature decreases under a certain bias voltage range. Nanoscale diodes with longer and wider intrinsic layers generate higher currents under a certain range of bias voltage and low temperature measurements.