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Electrical characterization of bulk 4H-SiC

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Abstract content
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The crystal lattice of SiC is identical to that of silicon and diamond, with half the lattice sites filled by Si and the other half by C atoms. SiC is the only chemical compound formed between Si and C. The compound crystalises into three stable polytypes namely 3H-, 4H- and 6H-SiC, each with unique physical properties. The high thermal conductivity and large break-down field make SiC a very attractive material for high temperature, high voltage devices. Additionally, SiC is resistant to particle and cosmic radiation, suggesting that these devices could operate in harsh environments.

In this study, the electrical properties of 4H-SiC is revisited as part of an honours research project. Pd Schottky barrier diodes were employed to determine the current transport characteristics by current-voltage measurements, while the free carrier concentration depth distribution, barrier height and built-in voltage were determined by capacitance voltage measurements. A prominent compound defect was detected around 200 K (20ms rate window) and consequently characterised by Laplace DLTS.

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