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DLTS and I-V-T characteristics of e-beam deposited Pd/W 4H-SiC Schottky contacts

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Abstract content **
 **(Max 300 words)

DLTS investigations of 4H-SiC homo-epitaxial layers of doping density $\sim 10^{14} - 10^{16} \text{ cm}^{-3}$ reveal the presence of two peaks below the conduction band, E_C , which we attribute to the e-beam metallization damage: at $(E_C - 0.160) \text{ eV}$ and at $(E_C - 0.121) \text{ eV}$. These peaks were, however, not observed in 10^{16} cm^{-3} material. In addition, the well-known peaks at $(E_C - 0.096) \text{ eV}$ and at $(E_C - 0.607) \text{ eV}$ were present in all our samples in the doping range investigated. We observed departure from thermionic-emission (TE) theory in the I-V-T characteristics in the temperature range $30 \text{ K} \leq T \leq 340 \text{ K}$, confirming the surface damage and indicative of an inhomogeneous Schottky barrier at the W/SiC interface. Both the Schottky barrier height (ϕ_{BO}) and the diode ideality factor (n) exhibited anomalous behaviour: typically in 10^{16} cm^{-3} doped SiC, $1.50 \text{ eV} \leq \phi_{BO} \leq 0.89 \text{ eV}$ and $1.10 \leq n \leq 4.60$ were observed, respectively, with decreasing measurement temperature. The inhomogeneous Schottky barrier was satisfactorily described by a Gaussian distribution with mean $\phi_{BO} = 1.30 \text{ eV}$ and standard deviation $\sigma_0 = 0.002 \text{ eV}$. Current conduction was predominantly TE for $T > 100 \text{ K}$ and was increasingly of a thermionic-field-emission (TFE) character for $T < 100 \text{ K}$.

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