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## Determining the Richardson constant of Ni/4H-SiC and W/4H-SiC Schottky diodes via Current-Voltage-Temperature (IVT) characteristics

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**Abstract content**   
 **Formatting**   
 **Special chars**

In this project the Richardson constant ( $A$ ) for metal-semiconductor contacts on 4H-SiC was investigated by means of current-voltage measurements as a function of temperature in the range of 300 K to 700 K. Multiple n-type 4H-SiC-based metal-semiconductor contacts, having an estimated carrier concentration of  $3.70 \times 10^{14} \text{ cm}^{-3}$  were considered. The current-voltage-temperature (IVT) characteristics of Ni/4H-SiC and W/4H-SiC Schottky barrier diodes were studied, based on the thermionic emission model. The samples were prepared using various deposition techniques, (viz. Ni – resistive evaporation and electron-beam deposition (EBD); and W – RF sputtering and EBD) and diode parameters (such as ideality factor ( $\eta$ ), Schottky barrier height ( $\Phi_B$ ), series resistance ( $R_s$ ) and saturation current ( $I_s$ )) obtained were compared and found to be strongly dependent on temperature. The Richardson constant for 4H-SiC obtained from the intercept of a least squares fit through the Arrhenius plot data resulted in  $3.72 \times 10^{-6} \text{ A.K}^{-2} \text{ cm}^{-2}$  for W and  $5.41 \text{ A.K}^{-2} \text{ cm}^{-2}$  for Ni – both deposited via EBD;  $2.63 \times 10^{-3} \text{ A.K}^{-2} \text{ cm}^{-2}$  for Ni deposited resistively, and lastly  $6.31 \times 10^{-12} \text{ A.K}^{-2} \text{ cm}^{-2}$  for sputtered W. It was concluded that  $A$  is dependent on the metal contact as well as the type of deposition technique utilized for the Schottky metal contacts.

**Apply to be considered for a student award (Yes / No)?**

Yes

**Level for award (Hons, MSc, PhD)?**

Hons

**Main supervisor (name and email) and his / her institution**

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**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

No

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