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Investigation of defects in sputter deposition deposited Schottky barrier diodes on epitaxial GaAs by Laplace DLTS

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High resolution deep level transient spectroscopy (Laplace DLTS) was used to study Si doped n-type epitaxial GaAs. In this work, we used Au as the target material for the deposition of GaAs samples by sputtering deposition system. Three different doping densities of GaAs ($1 \times 10^{15} \text{ cm}^{-3}$, $1 \times 10^{16} \text{ cm}^{-3}$ and $8 \times 10^{16} \text{ cm}^{-3}$) were deposited with 3 different powers 100 W, 150 W and 200 W for 10 minutes. From the Arrhenius plot, we found 3 defects with different energy levels (0.58 eV, 0.50 eV and 0.31 eV). The $E_c - 0.50$ eV defect is dopant dependent while the other two (0.58 eV and 0.31 eV) did not involve dopant atom. The $E_c - 0.58$ eV defect is bistable with the $E_c - 0.31$ eV defect, Under 0 V bias for 5 minutes, the $E_c - 0.31$ eV transforms to $E_c - 0.58$ eV and by applying the reverse bias the $E_c - 0.58$ eV transforms to $E_c - 0.31$ eV. This transformation is completely reversible. These results are the same as the results achieved by inductivity coupled plasma etching of GaAs [1]. The results from current-voltage measurements indicate that current reverse is a substantially higher compared to that of resistivity evaporated Schottky diodes.

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Yes

Level for award (Hons, MSc, PhD, N/A)?

PhD

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

Professor F.D.Auret

danie.auret48@gmail.com

University of Pretoria (UP)

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

No

Primary author: Ms TAGHIZADEH, Fatemeh (University of Pretoria)

Co-authors: Prof. AURET, Danie (University of Pretoria); Dr MEYER, Walter (University of Pretoria)

Presenter: Ms TAGHIZADEH, Fatemeh (University of Pretoria)

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