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Reliability Study of Silicon Carbide Schottky Diode with Fast Electron Irradiation (Conference Paper)

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Abstract

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The impact of fast electron exposure upon the performance of commercial silicon carbide Schottky diodes has been studied. Under 3 MeV electrons, absorbed dose of 10 and 15 MGy at room temperature, the forward current density-voltage characteristic of INFINEON and STMICROELECTRONICS devices have been decreased by 4.6 and 8.2 orders of magnitude respectively. The reduction is associated with the significant rise in the series resistance (INFINEON: 1.45 Ω to 121×10^{3} Ω; STMICROELECTRONICS: 1.44 Ω to 2.1×10^{9} Ω) due to the irradiation -induced defects. Besides that, the reverse leakage current density in INFINEON increased by one order of magnitude while reverse leakage current density in STMICROELECTRONICS decreased by about one order of magnitude. We have also observed an increase in ideality factor (INFINEON: 1.01 to 1.05; STMICROELECTRONICS: 1.02 to 1.3) and saturation current (INFINEON: 1.6×10^{-17} A to 2.5×10^{-17} A; STMICROELECTRONICS: 2.4×10^{-15} A to 8×10^{-15} A) as a result of electron irradiation . Overall, for particular devices studied, INFINEON have better quality devices and more radiation resistance compared to STMICROELECTRONICS. © 2018 IEEE.

SciVal Topic Prominence

Topic: Silicon carbide | Deep level transient spectroscopy | deep levels

Prominence percentile: 85.576

Author keywords

Electron | Radiation | Schottky diode | Silicon carbide

Indexed keywords

Engineering controlled terms: Current density | Diodes | Electric resistance | Electrons | Heat radiation | Schottky barrier diodes | Silicon carbide

Engineering uncontrolled terms: Fast electron irradiations | Irradiation -induced defects | Orders of magnitude | Radiation resistance | Reverse leakage current | Schottky diodes | Series resistances | Silicon carbide schottky diodes

Engineering main heading: Electron irradiation

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References (18)

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1 Fujita, S.

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(2015) *Japanese Journal of Applied Physics*, 54 (3), art. no. 030101. Cited 91 times.
http://iopscience.iop.org/1347-4065/54/3/030101/pdf/1347-4065_54_3_030101.pdf
doi: 10.7567/JJAP.54.030101

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2 Liu, G., Tuttle, B.R., Dhar, S.

Silicon carbide: A unique platform for metal-oxide-semiconductor physics

(2015) *Applied Physics Reviews*, 2 (2), art. no. 021307. Cited 81 times.
http://scitation.aip.org/content/aip/journal/apr2/browse
doi: 10.1063/1.4922748

View at Publisher

3 Millan, J., Godignon, P., Perpina, X., Perez-Tomas, A., Rebollo, J.

A survey of wide bandgap power semiconductor devices

(2014) *IEEE Transactions on Power Electronics*, 29 (5), art. no. 6532359, pp. 2155-2163. Cited 480 times.
doi: 10.1109/TPEL.2013.2268900

View at Publisher

4 Nguyen, K.V., Pak, R.O., Oner, C., Zhao, F., Mandal, K.C.
Investigation of 12 μm 4H-SiC epilayers for radiation detection and noise analysis of front-end readout electronics

(2015) *2015 IEEE Nuclear Science Symposium and Medical Imaging Conference, NSS/MIC 2015*, art. no. 7582285.
ISBN: 978-146739862-6
doi: 10.1109/NSSMIC.2015.7582285

View at Publisher

5 Bertuccio, G., Puglisi, D., Torrisi, L., Lanzieri, C.
Silicon carbide detector for laser-generated plasma radiation

(2013) *Applied Surface Science*, 272, pp. 128-131. Cited 18 times.
doi: 10.1016/j.apsusc.2012.03.183

View at Publisher

6 Godignon, P., Jorda, X., Vellvehi, M., Perpina, X., Banu, V., Lopez, D., Barbero, J., (...), Massetti, S.
SiC Schottky diodes for harsh environment space applications

(2011) *IEEE Transactions on Industrial Electronics*, 58 (7), art. no. 5585749, pp. 2582-2589. Cited 55 times.
doi: 10.1109/TIE.2010.2080252

View at Publisher

7 Semenov, A., Cojocari, O., Hübers, H.-W., Song, F., Klushin, A., Müller, A.-S.
Application of zero-bias quasi-optical schottky-diode detectors for monitoring short-pulse and weak terahertz radiation

(2010) *IEEE Electron Device Letters*, 31 (7), art. no. 5467206, pp. 674-676. Cited 63 times.
doi: 10.1109/LED.2010.2048192

View at Publisher

8 Nava, F., Bertuccio, G., Cavallini, A., Vittone, E.
Silicon carbide and its use as a radiation detector material

(2008) *Measurement Science and Technology*, 19 (10), art. no. 102001. Cited 151 times.
http://www.iop.org/EJ/journal/0957-0233
doi: 10.1088/0957-0233/19/10/102001

View at Publisher

9 Nicholas, T., Sheldon, L.
(2011) *Measurement and Detection of Radiation*. Cited 2 times.
3rd ed., 3rd ed. CRC Press

10 Çinar, K., Coşkun, C., Aydoğan, S., Asil, H., Gür, E.
The effect of the electron irradiation on the series resistance of Au/Ni/6H-SiC and Au/Ni/4H-SiC Schottky contacts

(2010) *Nuclear Instruments and Methods in Physics Research, Section B: Beam Interactions with Materials and Atoms*, 268 (6), pp. 616-621. Cited 16 times.
doi: 10.1016/j.nimb.2009.12.019

View at Publisher

11 Paradzah, A.T., Omotoso, E., Legodi, M.J., Auret, F.D., Meyer, W.E., Diale, M.
Electrical Characterization of High Energy Electron Irradiated Ni/4H-SiC Schottky Barrier Diodes

(2016) *Journal of Electronic Materials*, 45 (8), pp. 4177-4182. Cited 6 times.
doi: 10.1007/s11664-016-4609-z

View at Publisher

12 Omotoso, E., Meyer, W.E., Auret, F.D., Paradzah, A.T., Diale, M., Coelho, S.M.M., Janse Van Rensburg, P.J.
The influence of high energy electron irradiation on the schottky barrier height and the richardson constant of Ni/4H-SiC schottky diodes

(2015) *Materials Science in Semiconductor Processing*, 39, pp. 112-118. Cited 23 times.
doi: 10.1016/j.mssp.2015.04.031

View at Publisher

13 Benkovska, J., Stuchlikova, L., Buc, D., Čaplovic, L.
Electrical characterization of 4H-SiC Schottky diodes with $RuWO_x$ Schottky contacts before and after irradiation by fast electrons

(2012) *Physica Status Solidi (A) Applications and Materials Science*, 209 (7), pp. 1384-1389. Cited 8 times.
doi: 10.1002/pssa.201127559

View at Publisher

14 Ohyama, H., Takakura, K., Watanabe, T., Nishiyama, K., Shigaki, K.
Radiation damage of SiC Schottky diodes
(2005) *Technology*, 6, pp. 455-458.

15 Kozlovski, V.V., Lebedev, A.A., Levinshtein, M.E., Rumyantsev, S.L., Palmour, J.W.
Impact of high energy electron irradiation on high voltage Ni/4H-SiC Schottky diodes

(2017) *Applied Physics Letters*, 110 (8), art. no. 083503. Cited 6 times.
http://scitation.aip.org/content/aip/journal/apl
doi: 10.1063/1.4977095

View at Publisher

16 Omotoso, E., Meyer, W.E., Coelho, S.M.M., Diale, M., Ngoepe, P.N.M., Auret, F.D.
Electrical characterization of defects introduced during electron beam deposition of W Schottky contacts on n-type 4H-SiC

(2016) *Materials Science in Semiconductor Processing*, 51, pp. 20-24. Cited 5 times.
doi: 10.1016/j.mssp.2016.04.012

View at Publisher

17 Danno, K., Kimoto, T.
Investigation of deep levels in n -type 4H-SiC epilayers irradiated with low-energy electrons

(2006) *Journal of Applied Physics*, 100 (11), art. no. 113728. Cited 112 times.
doi: 10.1063/1.2401658

View at Publisher

18 Castaldini, A., Cavallini, A., Rigutti, L., Nava, F.

Low temperature annealing of electron irradiation induced defects in 4H-SiC

(2004) *Applied Physics Letters*, 85 (17), pp. 3780-3782. Cited 53 times.
doi: 10.1063/1.1810627

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