(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application :18/09/2024

(21) Application No.202441070534 A

(43) Publication Date : 04/10/2024

(54) Title of the invention : INFLUENCE OF INSULATING LAYER ON MS(METAL-SEMICONDUCTOR) DIODES

(51) International classification	:H01L0029872000, H01L0029660000, H01L0029510000, H01L0021285000, H01L0029200000
(86) International Application No Filing Date	:NA :NA
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

(71)**Name of Applicant :**

1)Malla Reddy Engineering College

Address of Applicant :Dhulapally post via Kompally Maisammaguda Secunderabad -500100 Secunderabad ---------- ----------

2)Dr. B. Prasanna Lakshmi

Name of Applicant : NA

Address of Applicant : NA

(72)**Name of Inventor :**

1)Dr. B. Prasanna Lakshmi

Address of Applicant :Associate Professor Department ofPhysics, Malla Reddy Engineering College, Maisammaguda (Post. Via. Kompally),Medchal-Malkajgiri-500100. State:Telangana Email ID: drprasannalakshmi85@gmail.com Number:6303809002 Secunderabad ---------- ----------

2)Mr. Kesava Vamsi Krishna Vajjala

Address of Applicant :Associate Professor Department of Physics, Malla Reddy Engineering College, Maisammaguda (Post. Via. Kompally),Medchal-Malkajgiri-500100. State:Telangana Email ID: mrecphysics@gmail.com Number:90302 34705 Secunderabad ---------- ----------

3)Dr. Mannepalli Sowjanya

Address of Applicant :Assistant Professor Department of Physics, Malla Reddy Engineering College, Maisammaguda (Post. Via. Kompally),Medchal-Malkajgiri-500100. State:Telangana Email ID: msowji55@gmail.com Number:90004 90585 Secunderabad ---------- ----------

4)Dr. Rekharani Maddula

Address of Applicant :Assistant Professor Gokaraju Lailavathi Engineering College, Bachupally, Hyderabad - 500090 State:Telangana Email ID: rekha2021glwc@gmail.com Number:63024 48505 Hyderabad ---------- ----------

5)Dr.V. Manjunath

Address of Applicant :Assistant Professor Department of Physics, Sri Padmavathi Mahila Viswavidyalayam (Women's University), Tirupati(AP) State:Andhra Pradesh Designation:Assistant Professor Email ID: drvmanju18@gmail.com Tirupati ---------- ----------

6)Mr. Kusuma Venugopal

Address of Applicant :Assistant Professor Department of Physics, Vignan's Institute of Management and Technology for Women, Kondapur(Vi),Gatkesar (Mdl), Medchal-Malkajgiri-501301 State:Telangana Email ID: venug749@gmail.com Number:9849734917 Ghatkesar ---------- ----------

7)Dr. K. Dhanaraj

Address of Applicant :Assistant Professor Department of Physics, St. Joseph;s College of Engineering, Chennai-119. State:Tamilnadu Email ID: rajidhana01@gmail.com Number: 9941168384 Chennai ---------- ----------

8)Ms. K. Jayasri

Address of Applicant :Assistant Professor Department of Physics, Malla Reddy Engineering College, Maisammaguda (Post. Via. Kompally),Medchal-Malkajgiri-500100. State:Telangana Email ID: yelisettyjayasri@gmail.com Number: 7780406610 Secunderabad ---------- ----------

9)Dr. V. Vijayasundaram

Address of Applicant :Professor Adhiparasakthi Engineering College Melmaruvathur-603319 Kanchipuram Dt State:Tamilnadu Email ID: vijayasundaram@apec.edu.in Number:9994901931 Melmaruvathur ---------- ----------

10)Dr. K Veeramuthu

Address of Applicant :Associate Professor Thiru Kolanjiappar Govt. Arts College, Vriddhachalam - 606001 State:Tamilnadu Email ID: veeramuthu.k@rediffmail.com Number:9751460481 Vriddhachalam ---------- ----------

11)Dr. R. Nithya

Address of Applicant :Associate Professor St. Martin's Engineering College, Kompally, Secunderabad 500100 State:Telangana Email ID: nithyarameshphd1981@gmail.com Number:95663 82542 Secunderabad ---------- ----------

(57) Abstract :

Gallium nitride (GaN) has been considered as a superior materialfor applications in high-power and high-frequency transistorsoperating at elevated temperatures, owing to their large anddirect band gap, as well as favorable transport properties.There has been considerable interest in the experimentalstudies of metal-semiconductor (MS), metal-insulator-semiconductor(MIS) type Schottky diodes in the past decades. The popularity of such studies, rooted in their importanceto the insulator layer between metal and semiconductor. The existence of such interfacial insulator layer converts the MSdiodes to MIS type diodes and can have strong influence on thedevice characteristics as well as the interface state density (NSS),Schottky barrier height (SBH) and ideality factor (n).We have investigated the current-voltage (I-V) characteristics of (Au/SiO2/n-GaN) metal-insulator-semiconductor (MIS) Schottky diodes and compared with (Au/n-GaN) metal-semiconductor (MS) Schottky diode. The effect of SiO2on the surface preparation of n-GaN (MIS) Schottky diode is analyzed.It is observed that the Schottky barrier height increases from 0.79eV to 0.86 eV, the ideality factor deceases from 1.45 to 1.3, by inserting the SiO2 insulating layer. The interface state density as determined by Terman's method is found to be 3.79×1012and 3.41×1010 cm-2 eV-1 for the MS and MIS Schottky diodes, which again decreased by the insulating layer.

No. of Pages : 5 No. of Claims : 5