MNDCS 2026

6th International Conference on

Micro/Nanoelectronics Devices, Circuits and Systems

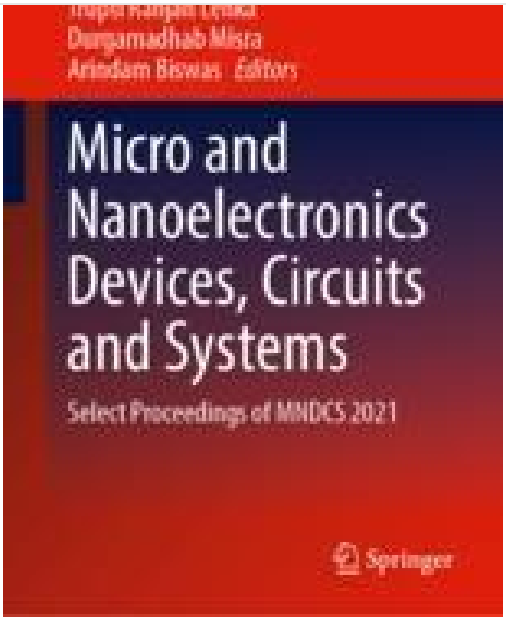
National Institute of Technology Silchar

Conference Date: 29-31 January 2026

:k Here

Proceedings of MNDCS 2023
Proceedings of MNDCS 2022
Proceedings of MNDCS 2021

MNDCS 2026



Publication Partner

Springer

About The *MNDCS 2026*

The Department of Electronics and Communication Engineering, National Institute of Technology Silchar, Assam, India (http://www.nits.ac.in) in association with IEEE EDS NIT Silchar Student Branch Chapter and IEEE Nanotechnology Council Chapter organizes 6th International Conference on MNDCS-2026 during 29-31 Jan 2026. The objective of this conference is to promote advanced research and developments in the areas of Microelectronics, Nanoelectronics, Semiconductor Devices, VLSI Circuits, and Systems. The conference aims to foster the theme through EDS/NTC Distinguished Lectures, Keynote talks, Invited talks, and Oral presentations of research articles in the most relevant areas allied to the theme of the conference. It'll

scientists.

It is planned to publish the peer-reviewed and selected papers of the conference as proceedings with Springer in their prestigious “Lecture Notes in Electrical Engineering” series (https://www.springer.com/series/7818). For detailed instructions for authors and editors of conference proceedings, kindly visit the following link: https://www.springer.com/us/authors-editors/conference-proceedings. Select papers from the conference will be published by Springer as a proceedings book volume. Springer will conduct quality checks on the accepted papers and only papers that pass these checks will be published. Springer Nature does not charge any money for the publication of Non-Open Access content. Abstracts/extended abstracts and short papers (less than 4 pages) are not considered for publication.

MNDCS 2026 CONFERENCE BROCHURE

About the *CAMPUS*

High-Sensitivity NH_3 Detection Using a 3D Junctionless IGZO Nanowire FET (JLNWFET) Gas Sensor: A Silvaco TCAD Approach

Indranil Maity[1][0000-0002-4919-3072] , Arighna Bhattacharjee[2][0009-0002-9917-6008], Ankit Biswas[2][0009-0001-0124-9807] and Malay Gangopadhyay[1][0009-0005-3250-8209]

[1]Department of Electronics and Communication Engineering, Institute of Engineering and Management, University of Engineering and Management, Kolkata, India
[2]Department of Electronics and Communication Engineering, Institute of Engineering and Management, Kolkata, India
indrasanu026@gmail.com

Abstract. In this present work, a three-dimensional cylindrical Junctionless IGZO nanowire FET (JLNWFET) for detection of NH_3 gas, based on catalytic gate metals (Ru, Rh, Mo) with controllable work function modulation through gas adsorption was designed and examined. The device performance was characterized by SILVACO ATLAS simulation with quantum confinement, mobility degradation, and recombination–generation mechanisms at 300 K temperature conditions. The sensor demonstrated excellent performance: a 200 meV work-function shift induced an OFF-state sensitivity greater than 2×10^3, and an ON-state sensitivity of 0.304. Ruthenium-gated devices achieved the best performance, enhancing the I_{ON}/I_{OFF} current ratio by up to eight orders of magnitude following exposure to ammonia. These findings indicated that junctionless nanowire FETs, especially when gate stacks are optimized using Ru–HfO_2 gate stacks, yield a low-power, integrable platform for real-time gas detection with high sensitivity.

Keywords: Junctionless FET, nanowire, ammonia sensor, catalytic gate metal, work function modulation, sensitivity, ON-OFF ratio.

1 INTRODUCTION

There has been an increasing need for low-power, miniaturized, and sensitive gas sensors over the past few years due to their increasing applicability to environmental monitoring, industrial safety, and diagnosing healthcare conditions. Detection of gases like ammonia (NH_3)—toxic even in trace amounts—has been of utmost importance [1]. Semiconductor gas sensors, particularly field-effect transistor (FET)—based devices, possess some benefits like label-free detection, on-chip integrability, and real-time monitoring [2]. Among them, nanowire FETs (NW-FETs) have been identified as promising platforms due to high surface-to-volume ratio and better electrostatic gate control, allowing deeper interaction with target analytes and better sensor response [1].

[14] Ofuonye, B., Lee, J., Yan, M., Sun, C., Zuo, J. M., and Adesida, I. (2014). Electrical and microstructural properties of thermally annealed Ni/Au and Ni/Pt/Au Schottky contacts on AlGaN/GaN heterostructures. *Semiconductor Science and Technology*, Volume 29, NO. 9, 095005.

[15] Singh, S., Sharma, A., Kumar, V., Umar, P., Rao, A. K., and Singh, A. K. (2021). Investigation of N^+ SiGe junctionless vertical TFET with gate stack for gas sensing application. *Applied Physics A, Volume 127, No. 9*.

[16] Singh, S., Kumari, J., Gupta, A., and Wadhwa, G. (2023). Design and analysis of double-gate junctionless vertical TFET for gas sensing applications. *Applied Physics A, Volume 127, NO. 16*.

[17] Arkoti, N. K., and Pal, K. (2022). Work Function Modification of Borophene by Barium Decoration Towards Room Temperature NO_2 Gas Sensor. *IEEE Sensors*, *Pages 1-4.*

[18] Tirado, J. M., Rojas, J. L. S., and Izpura, J. I. (2007). Trapping Effects in the Transient Response of AlGaN/GaN HEMT Devices. *IEEE Transactions on Electron Devices*, *Volume 54, No. 3, Pages 410–417.*

[19] Singh, S., Verma, A., Singh, J., and Wadhwa, G. (2022). Investigation of N + SiGe Gate Stacked V-TFET Based on Dopingless Charge Plasma for Gas Sensing Application. *Silicon*, *Volume 14, Pages 6205–6218*.

[20] Jahangir, M., Chauhan, V. K., Kumar, S., Yadav, K., and Saxena, A. (2021). Graphene/MoS2 Thin Film Based Two Dimensional Barristors With Tunable Schottky Barrier for Sensing Applications. *IEEE Sensors Journal, Volume 21, No. 23, Pages 26549–26555.*

[21] Maity, I., Nagasawa, H., Tsuru, T., and Bhattacharyya, P. (2020). Correlation between ammonia selectivity and temperature dependent functional group tuning of GO. *IEEE Transactions on Nanotechnology*, *Volume 20, Pages 129–136.*

[22] He, X., Guo, P., Ren, X., An, X., Li, Y., Liang, S., Wang, Z., Zhang, J. (2024). High-Performance ammonia gas sensor based on a catalytic ruthenium- gated Field-Effect transistor. *ACS Applied Nano Materials, Volume 7, No. 14, Pages 16395–16403.*

[23] Verma, C., Singh, J., Tripathi, S.K., Kumar, R. (2021). Design and performance analysis of Ultrathin Nanowire FET Ammonia Gas Sensor. *Silicon, Volume 14, No. 11, Pages 6321–6327.*

[24] Jain, A., Jain, P.K. (2025). Optimization of a-IGZO top gate thin film transistor for ammonia gas sensor. *Next Materials*, *Volume 8, p. 100764.*

[25] Das, S., Singh, K. (2025). Stacked split gate oxide DG P–I–N Hetero-Vertical TFET based gas sensor for sensing O2, H2 and NH3. *Micro and Nanostructures*, *Volume 206, p. 208233.*

National Institute of Technology Silchar, Assam, India
Department of Electronics and Communication Engineering

IEEE EDS Mini-Colloquium &

6th International Conference on Micro/Nanoelectronics Devices, Circuits, and Systems (MNDCS-2026) (Hybrid Mode), 29th -31st January, 2026

CERTIFICATE

Best Paper Award

FOR YOUR PARTICIPATION

This certificate is proudly presented to

Arighna Bhattacharjee

Institute of Engineering & Management, Kolkata, West Bengal, India

In recognition of their paper *Paper ID 93: "Efficient Detection of NH3 using a 3D Junctionless IGZO Nanowire FET (JLNWFET) based Gas Sensor via Silvaco TCAD Model"* selected for **Best Paper Award** in Track 3 of MNDCS 2026.

MNDCS-2026

Dr. K. Guha
Patron & HoD, ECE

Prof. F. A. Talukdar
Patron & EDS Branch Counselor

Dr. T. R. Lenka
General Co-Chair

Gmail Ankit Biswas <ankitbiswas594@gmail.com>

Fwd: Acceptance Notification of Manuscript Submitted to MNDCS-2026

1 message

Indranil Maity <indrnilmaity026@gmail.com> Wed, Dec 24, 2025 at 8:07 PM
To: arighnabhattacharjee003@gmail.com, Ankit Biswas <ankitbiswas594@gmail.com>

Thanks and Regards,

Dr. Indranil Maity
Assistant Professor,
Electronics and Communication Engineering (ECE) Department
Institute of Engineering & Management (IEM), Kolkata
Y-12, Salt Lake Electronics Complex,
Sector- V, Salt Lake, Kolkata -700 091,
West Bengal, India.

---------- Forwarded message ---------
From: **Microsoft CMT** <noreply@msr-cmt.org>
Date: Wed, 24 Dec 2025, 19:09
Subject: Acceptance Notification of Manuscript Submitted to MNDCS-2026
To: Dr. INDRANIL MAITY <indrnilmaity026@gmail.com>
Cc: <koushik@ece.nits.ac.in>

Dear Author,

Greetings from IEEE EDS NIT Silchar Student Branch Chapter!
Wish you Merry Christmas and Happy New Year!

We are pleased to Congratulate you on the acceptance of your Paper: 93 entitled “Efficient Detection of NH3 using a 3D Junctionless IGZO Nanowire FET (JLNWFET) based Gas Sensor via Silvaco TCAD Model” for ORAL presentation at 6th International Conference on Micro/Nanoelectronics Devices, Circuits and Systems (MNDCS-2026), 29-31 Jan 2026 and possible inclusion in the Springer LNEE Conference Proceedings.

You are sincerely advised to incorporate the review comments in the revised manuscript and submit the revised manuscript in Springer LNEE (Lecture Notes in Electrical Engineering) format in the CMT portal by the due date as mentioned in https://mndcs.nits.ac.in/.

To check review comments please visit: https://cmt3.research.microsoft.com/User/Login?ReturnUrl=%2FCMTSRM

The final manuscript must be more than 6 pages, and free from typo and English grammatical errors. The manuscript should not use any 3rd party contents such as copied text, figures/images etc. High quality of figures must be used in the revised manuscript.

Please Note: The similarity index of the manuscript must be less than 15% otherwise, it’ll not be included in the Springer LNEE Book.

The instructions related to paper registration, will be circulated soon. Please visit https://mndcs.nits.ac.in/ for updates.

Thanks for your high-quality contributions, and looking forward your active participation to make the MNDCS-2026 a great success.

Best Wishes

General Co-Chair
MNDCS-2026

Please do not reply to this email as it was generated from an email account that is not monitored.

To stop receiving conference emails, you can check the 'Do not send me conference email' box from your User Profile.

Microsoft respects your privacy. To learn more, please read our Privacy Statement.

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052