C3N T

NEWSLETTER

Fall 2024

Swedish Center for III-Nitride Technology

UPCOMING EVENTS

C3NiT Day 2024

Annual C3NiT meeting and workshop

Wednesday 20th of November 2024

Lund University

C3NiT presents at these Conferences

2 invited talks, 2 talks & 2 posters at the 12th IWN link

1 keynote and 2 talks at the APWS 2024. link

1 invited talk and 1 talk at the AVS70. link

PUBLICATIONS

A. Divinyi, et al. "*On-Chip Sensors for Temperature Monitoring of Packaged GaN MMICs.*" IEEE Transactions on Components, Packaging and Manufacturing Technology, vol. 14, no. 5, pp. 891-896, (2024). Link

J. Bremer, et al. „*Method for Suppressing Trap-Related Memory Effects in IV Characterizations of GaN HEMTs*" 2024 IEEE 36th International Conference on Microelectronic Test Structures (ICMTS), Link

A. M. Vidarsson, et al. „*Detection of Very Fast Interface Traps at 4H-SiC/AlN and 4H-SiC/Al_2O_3 Interfaces.*" Solid State Phenomena, Vol. 358, pp. 59–64, (2024). Link

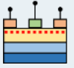
A. Papamichail, et al. „*Impact of Al profile in high-Al content AlGaN/GaN HEMTs on the 2DEG properties.*" Appl. Phys. Lett. 125, 123505 (2024). Link

V. Rindert, et al. „*Bloch equations in terahertz magnetic-resonance ellipsometry.*" Phy. Rev. B 110 (5) 54413 (2024). Link

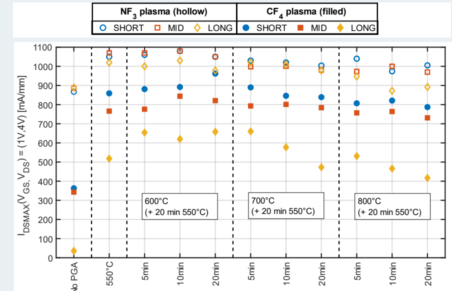
For more publications visit https://c3nit.se/publications/

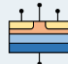
PROJECT UPDATES

AlGaN/GaN HEMT gate opening process optimization



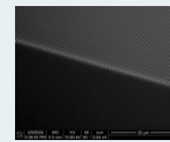
Chalmers has developed F plasma for gate opening of the SiN_x passivation for lateral scaling of high frequency HEMTS. The effects of different NF_3/CF_4 plasma chemistries and varying degrees of over-etching on HEMT performance are established. A pre gate annealing process at 550 - 800 ℃, is developed to recover device characteristics by reducing the F concentration and repairing the crystal structure.

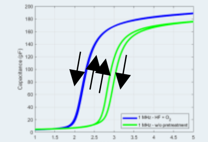


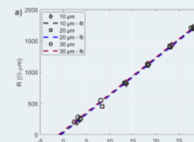


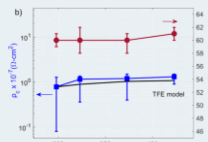
Vertical devices for power application

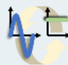
Lund University, Volvo Cars and Hexagem have scaled the fabrication process for large area vertical FinFETs. Large arrays of high-quality Fins (width<100 nm) can be produced. In addition, GaN MOS diodes on GaN substrates with MESA isolation are developed. Different pretreatments were applied during fabrication, leading to an optimized process with small hysterisis. Furthermore, fabrication and characterization of ohmic contacts were done using different metal stacks and Schottky diodes. We achieved exceptional ohmic contacts with very low specific contact resistivity of ρ_c= 0.8 x 10^{-7} Ω cm^2 for the annealed Ti/Al/Ni/Au metal stack. Temperature-dependent electrical measurements of the Schottky diodes allowed us to establish key ideality factors, barrier heights, resistances, and breakdown voltages.





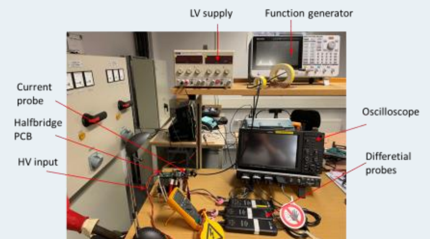






Propulsion/Charger/Converter/Switching applications

The newly built DPT (double-pulse test) setup at Chalmers is used to characterize GaN commercial transistors. Both turn-on and turn-off waveforms are measured and studied under a test condition of 400 V DC voltage and 5 A current. In addition, the performances of different measurement equipment types are compared, which classifies specifications for measurement instruments for GaN devices. As a result of the activity, purchase of top-of the line-probes is presently being conducted.



Next Board Meeting November 21st 2024 at Lund University

LINKÖPING UNIVERSITY · CHALMERS · LUNDS UNIVERSITET · FMV · Hitachi Energy · Veeco · gotmic · ERICSSON · SKÅNE · SAAB · SWEGAN · Hexagem · ums · VOLVO · VINNOVA