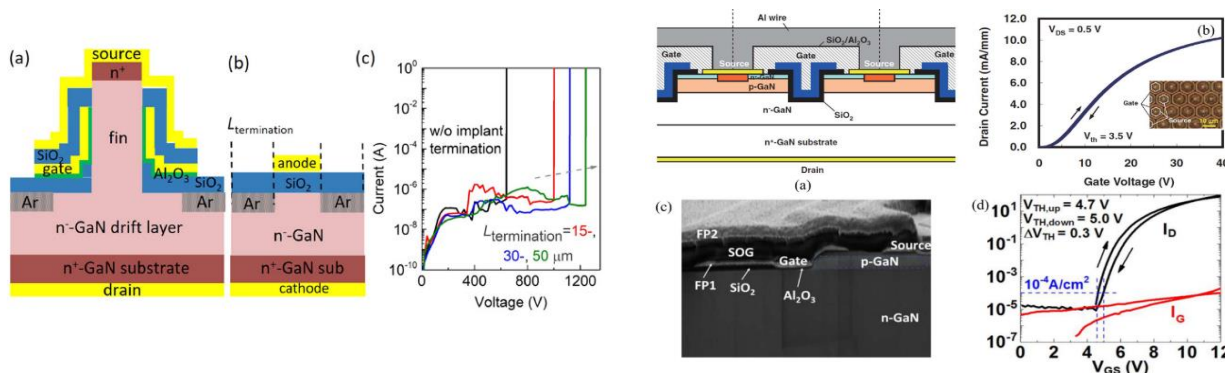


# MASTER THESIS PROPOSAL

## Performance and Reliability Investigation of Next-Generation Vertical GaN Transistors for High-Power Applications

(EU-funded project “YESvGaN”) – Twitter @YESvGaN



Vertical FinFET. Ref: Y. Zhang et al., IEEE EDL, 2019.

Vertical Trench MOSFET. Ref: H. Fu et al., IEEE TED, 2021.

**Objective:** TCAD (Technology Computer Aided Design) simulation to investigate performance/reliability aspects in Vertical GaN Power Transistors

**Start Date (Approx.):** September 2021

**Description:** Wide-Band-Gap (WBG) semiconductors are establishing new records in the field of power electronics and are among the best alternatives to Silicon in high performance applications (automotive, energy conversion, space equipment, etc.).

Among these, Gallium Nitride (GaN)-based devices stand out thanks to their excellent metrics, low manufacturing cost, and good versatility in terms of operating power/frequency. While lateral GaN transistors are relatively established and already found commercial application, vertical transistors (i.e., with current flowing from the source at the top and drain at the bottom of the structure, controlled laterally by the gate terminal) are still in their infancy.

The recent *European project “YESvGaN”* (lead by Bosch) aims at developing low-cost GaN vertical transistors (built on Si substrates) with voltage/current capability up to 1200 V and 100 A.

The Master Thesis project involves the realization of a TCAD simulation platform for analyzing the electrical performance (i.e., current-voltage and capacitance-voltage characteristics) and reliability (i.e., physical mechanisms leading to early breakdown, threshold voltage/on-resistance degradation, etc.) of GaN vertical transistors. Data obtained from this analysis will be delivered to partners to guide the development of the technology.

**For more information, visit [www.e-lab.unimore.it/thesis-proposal/](http://www.e-lab.unimore.it/thesis-proposal/) or contact:**

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