Editorial
2019 Electron Devices Society George E. Smith Award

IT IS my great pleasure to announce the winner of the 2019 Electron Devices Society George E. Smith Award given to a letter published in the IEEE ELECTRON DEVICE LETTERS (EDL) in 2019. The selection was made by vote of EDL's Editors. The letter is titled "Large-Area 1.2-kV GaN Vertical Power FinFETs With a Record Switching Figure of Merit" and it is authored* by Yuhao Zhang, Min Sun, Josh Perozek, Zhihong Liu, Ahmad Zubair, Daniel Piedra, Nadim Chowdhury, Xiang Gao, Kenneth Shepard, and Tomás Palacios. The letter was published in the January 2019 issue of EDL.

I have asked the authors to write a summary of their winning paper. Here, it is:

Power electronics, present wherever electricity is used, is in the middle of an amazing transformation. The requirements of electric vehicles, distributed photovoltaic and highly integrated consumer electronic products demand high voltage switches with ever higher switching frequencies and power densities. In this domain, Gallium Nitride electronics offers unprecedented opportunities thanks to the very high critical electric field and excellent transport properties of this wide bandgap semiconductor.

Unfortunately, all the GaN power devices commercially available today have a lateral architecture, which limits their voltage and current rating. A vertical structure would offer enhanced thermal management, higher current levels and lower the cost of multi-kilovolts devices. Although several proposals exist for vertical GaN transistors, they all require either difficult epitaxial regrowths or conduction through low mobility p-type GaN. The work by Zhang *et al.* published in the January 2019 issue of IEEE ELECTRON DEVICE LETTERS describes a new high-current high-voltage vertical GaN architecture, the vertical GaN FinFET, which overcomes these challenges. Instead of using heterostructures or p-GaN to confine the transistor current to the gate-modulated region like in previous vertical transistors, Zhang's device confines the current flow geometrically by using narrow n-type vertical fins with the gate electrode around them. The parallel operation of close to 700 vertical fins allows for a transistor with 5 A of total current and 1200 V of blocking voltage. These prototype devices have already demonstrated superior switching figures-of-merit when compared to today's best Si and SiC power devices with similar ratings. This highlights their great potential as a key building block for the next generation of power electronics and to advance the performance of power conversion systems in electric vehicles, photovoltaic inverters, smart grids, and many other applications.

My warmest congratulations to the winning authors!

JESÚS A. DEL ALAMO, *Editor-in-Chief*

*Y. Zhang was with Massachusetts Institute of Technology, Cambridge, MA. He is now with Virginia Polytechnic Institute and State University, Blacksburg, VA. M. Sun was with Massachusetts Institute of Technology. He is now with University of Electronic Science and Technology of China, Chengdu, China. J. Perozek, A. Zubair, N. Chowdhury, and T. Palacios are with Massachusetts Institute of Technology. Z. Liu is with Xidian University, Xi'an, China. D. Piedra was with Massachusetts Institute of Technology. He is now with Analog Devices Inc., Wilmington, MA. X. Gao is with IQE RF LLC, Somerset, NJ. K. Shepard is with Columbia University, New York, NY.

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