

Conference changes

Technology breakthroughs at the 2020 IEEE International Electron Devices Meeting, which this year takes place online.

Every December, the **IEEE International Electron Devices Meeting (IEDM)** provides a forum for reporting — and exploring — developments in semiconductor and electronic device technology. In 2018 and in 2019, we highlighted some of the breakthroughs reported at the meeting. This year we return to the IEDM and offer our highlights of the 2020 event. The difference this year is that the IEDM will take place online, rather than in San Francisco.

We begin with **work** on a central theme of electronics — transistor scaling. Gate-all-around nanoribbon device architectures — in which the silicon nanoribbon channels are completely surrounded by a gate — could be the next step in the evolution of complementary metal–oxide–semiconductor (CMOS) field-effect transistor technology. Typically, the n-type and p-type transistors are placed side-by-side in these devices. Cheng-Ying Huang and colleagues at Intel have now developed an approach to vertically stack n-type and p-type nanoribbon transistors, creating three-dimensional CMOS devices that take up 50% less area than the two-dimensional design.

Next we highlight two papers related to high-voltage electronics. First is **work** from Yuhao Zhang and colleagues who have developed multichannel AlGaIn/GaN

Schottky barrier diodes that can operate at 5 kV. The researchers — who are based at various institutes in the US and China — use, in particular, a three-dimensional anode architecture that wraps around the multiple fin-shaped channels. Second is **work** from Winston Chern and colleagues at the Massachusetts Institute of Technology and Massachusetts General Hospital who have developed a silicon vacuum transistor capable of operating at up to 38 kV.

We then **cover** work from Jisan Lee and colleagues at the Samsung Advanced Institute of Technology on a single-chip beam scanner for use in light detection and ranging (LIDAR), a technology for measuring distances that is of use in applications such as autonomous vehicles. We also **cover** work from Steve Chung and colleagues at various institutes in Taiwan on combining resistive random-access memory devices with a fin field-effect transistor platform to create a hardware random number generator. Finally, we **highlight** work from Aleksandar Aleksov and colleagues at Intel and the Massachusetts Institute of Technology on organic package substrates for use in a variety of radio-frequency and terahertz components.

Something else to look out for at IEDM 2020 is the panel discussion on Thursday 17 December. Jointly organized by the

IEDM committee, editors from *Nature* and us (the editors of *Nature Electronics*), the event will explore what electronics can do to help solve grand societal challenges. It promises to be an entertaining and thought-provoking event.

In our **Editorial** last December, we touched upon the need to reflect on the necessity of any conference — and the necessity of any air travel attending might require — given the climate change crisis. The ongoing coronavirus pandemic has shifted that discussion. Conferences throughout the year have had to adapt quickly and become virtual events. The benefits of this are manifold, from the environmental impact to the potential for broader participation.

Recreating key elements of in-person conferences, such as the chance encounters and discussions that can occur between sessions, can though be difficult. And a return to in-person events, post-pandemic, can be expected. But conference organizers are still exploring and optimizing how best to host virtual events, and learning quickly. This is the time to push towards a more balanced, more sustainable and more inclusive approach to conferences. □

Published online: 14 December 2020
<https://doi.org/10.1038/s41928-020-00524-2>

