Special Issue on Silicon Carbide Devices and Technology

SINCE THE last TRANSACTIONS ON ELECTRON DEVICES Special Issue on SiC technology and devices, in March 1999, tentative steps have begun toward commercialization in several areas, e.g., power devices, UV sensors, and circuit modules. The commercialization trend should accelerate with further reductions in the basic material costs and with continued lowering of material defect densities, which should lead to improved device performance as well as enhancements in device yields. Since the last Special Issue impressive gains in the experimentally observed figures of merit for both power and high frequency devices have been realized, brought about by multiple changes, viz innovative and improved designs, better processing and lower defect densities. A particularly encouraging trend is the emerging interest in SiC power integrated circuits, including low-voltage and logic circuits. As expected, the thrust is toward fully integrated SiC power conditioning and RF transmitter modules. Certainly, the packaging of an entire SiC circuit in the same module has the advantage of the high temperature and high breakdown field properties of SiC.

A promising sign has been the increased diversity and progress made in power device switch development since the last Special Issue. At that time there were few SiC switches undergoing experimental study except for MOSFETs. Today MOSFETs still dominate, but SiC switches such as JFETs, MESFETs, gate turn-off thyristor structures, IGBTs and BJTs are also receiving attention.

The response to this Special Issue increased noticeably when compared to the previous one, indicating continued vigorous research activity in SiC devices and technology. Device papers heavily involved with processing, as well as material characterization, are strongly represented in the present issue (as they were in the 1999 issue). The continuation of this research activity should be viewed as a very positive influence. Indeed, the sought after improvements in SiC devices, in terms of performance and cost, will be severely hampered without continued progress and input from research in processing and materials.

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Tsunenobu Kimoto (M'00) received the B.E. and M.E. degrees in electrical engineering and the Ph.D. degree, based on his work on SiC epitaxial growth, characterization, and high-voltage diodes, from Kyoto University, Kyoto, Japan, in 1986, 1988, and 1996, respectively.

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Prof. Cooper served as an Associate Editor for the IEEE TRANSACTIONS ON ELECTRON DEVICES from 1983 to 1986 and as a Coeditor of the 1999 and 2008 Special Issues of the IEEE TRANSACTIONS ON ELECTRON DEVICES on SiC technology. He currently serves on the editorial advisory board of *IEEE Proceedings*.

Maurice Weiner (F'92) received the Ph.D. degree in physics from New York University, New York, in 1971.

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Dr. Weiner was the Chairman of the 1994 IEEE Power Modulator Conference and served as a Coeditor of a Special Issue of the IEEE TRANSACTIONS ON ELECTRON DEVICES (December 1990) devoted to optically controlled semiconductor devices. He received the U.S. Army Research and Development Award in 1984, 1988, and 1992.