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Foreword

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Nanosciences and nanotechnologies have opened a new era in the field of devices and circuits based on new physical properties. Due to their impressive electrical, mechanical, and thermal properties, currently carbon nanotubes are one of the most promising topics for new devices and circuits. The microwave and millimeterwave devices could benefit from these exceptional characteristics which exceed with order of magnitudes similar properties of semiconductors or compound semiconductors. For example, the carrier mobilities exceeding 10^4 cm^2/V s are very appealing for a future generation of devices and circuits operating beyond 100 GHz. Graphene – a one-atom thick carbon nanomaterial which when rolled-up via various chemical processes forms carbon nanotubes is also a good candidate for FETs working well beyond 100 GHz.

The demand of ultrafast devices and circuits is high, because according to Edholm law the need for larger bandwidths in wireless communications has doubled every 18 months over the last 25 years. This means that in a couple of years in the wireless communications the transmission and receiving data rates will exceed 10 GBs, meaning that the carrier frequencies must be beyond 100 GHz.

The papers collected in this special issue reflect the above demands. Carbon nanotube interconnects, fast switches, absorbers, printed technologies, and FETs featuring high cutoff frequencies are the key issues for the very important challenges in the field of microwaves and wireless technologies. Three years ago, it was almost impossible to have a special issue on the RF carbon nanotubes and graphene devices, while today many research laboratories through national, international, and European support have started to design and fabricate microwave carbon nanotubes and graphene devices and circuits. Significant scientific advances have been achieved both at the material level and device and circuit level that have translated to the emergence of a family of new "nanodevices and nanocircuits" that is opening a new era for the microwave community.

Mircea Dragoman was born in Bucharest, Romania, 1955. He received M.Sc. and Ph.D. degrees from Polytechnical Institute of Bucharest, Romania in 1980 and 1991, respectively. He is a principal researcher at the National Research Institute for Microtechnology, Bucharest, Romania. He was a visiting professor at Univ. Duisburg, Mannheim, Frankfurt and Darmstadt, all located in Germany, Tor Vergata – Rome, Italy, Univ. Saint-Etienne and Toulouse, France. He is the author of more than 200 papers in the area of nanoelectronics, microwave and millimeter-waves, terahertz, RF-MEMS, optics, and optoelectronics. He is the coauthor of the following books: Advanced Optoelectronic Devices (Springer, 1999), Optical Characterization of Solids (Springer, 2002), Quantum–Classical Analogies (Springer, 2003) and Nanoelectronics: Principles and Devices (Artech House, 2005 and 2009). His current research interests are graphene and carbon nanotube nanodevices, RF-NEMS, and terahertz electronics. He pioneers research in the area of carbon nanotubes and graphene devices for microwave and millimeterwave applications. I am the recipient of the 1991 Alexander von Humboldt Fellowship, and the 1999 Romanian Academy Prize "Gh. Cartianu."

Robert Plana was born on March 1964 in Toulouse. He received his Ph.D. in 1993 at LAAS-CNRS and Paul Sabatier University on the Noise modelling and characterization of Advanced Microwave devices (HEMT, PHEMT, and HBT) that include the reliability. In 1993, as an associate professor at LAAS-CNRS, he started a new research area concerning the investigation of millimeterwave capabilities of Silicon-based technologies. More precisely, he has focussed on the microwave and millimeterwave properties of SiGe devices and their capabilities for low-noise circuits. In 1995, he started a new project concerning the improvement of the passives on silicon through the use of MEMS technology. In 1999, he was involved with SiGe Semi-conductor in Ottawa where he was working on the low-power and low-noise-integrated circuits for RF applications. In the same year, he received a special award from CNRS for his works on Silicon-based technology for millimeterwave communications. In 2000, he was a professor at Paul Sabatier University and Institut Universitaire de France and he started a research team at LAAS-CNRS in the field of Micro and Nanosystem for RF and millimeterwave communications. His main interests are in technology, design, modeling, test, characterization, and reliability of RF MEMS for low-noise and high-power millimeterwave applications and the development of the MEMS IC concept for a smart microsystem. He has built a network of excellence in Europe in this field "AMICOM" regrouping 25 research groups. He has authored and coauthored more than 300 international journals and conferences. In 2004, he was appointed as deputy director of the Information and Communication Department at the CNRS Headquarter. Since January 2005 to January 2006, he has been the director of the Information and Communication Department at CNRS. Since 2006, he is heading a research group at LAAS-CNRS in the field of Micro and Nanosystem for wireless communications. From November 2007 to November 2009, he joined the "French research Agency" where he was the project officer of the National Nanotechnology Initiative. Since November 2009, he has been appointed as head of the department "Physic, Mathematics, Nanosciences & Nanotechnology, Information and Communication Technology" at the Ministry of research in charge of defining the French strategic for research and innovation.