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Substrate Integrated Circuits (SICs) for Microwave and Millimeter-Wave Systems and Applications

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ABSTRACT

Widespread applications and commercial success of future GHz and THz electronic and photonic devices and systems including RF, microwaves and millimeter-waves are closely related to their manufacturing cost and circuit integration. Our proposed integration technologies of planar and non-planar structures as well as related new progress indicate that the emerging substrate integrated circuits (SICs) are able to provide unprecedented advantages for developing low-cost GHz/THz components, systems and wireless photonic applications. This talk reviews the state-of-the-art and underlying features of the proposed integration platforms for designing the next generation RF/millimeter-wave ICs and systems. Challenging issues and future directions are discussed for research and developments. Potential problems and possible solutions are also presented. It is believed that the newly proposed concept of SICs will offer a potentially cost-effective and performance-promising solution for mass commercial applications. With the development of innovative fabrication processes and material synthesis techniques, unique hybrid and monolithic high-density 3-D integration of planar and non-planar structures (or system-on-substrate approach) become realizable. It can also be demonstrated that this scheme of SICs may be able to effectively bridge the gap between electronics and photonics. In this presentation, our current research activities and future RF/millimeter-wave research directions will be discussed.

BIOGRAPHY

Dr. Ke Wu is Professor of electrical engineering, and Canada Research Chair in RF and millimeter-wave engineering at the Ecole Polytechnique (University of Montreal). He has been the Director of the Poly-Grames Research Center and the Founding Director of the Center for Radiofrequency Electronics Research of Quebec. He has authored/co-authored over 720 referred papers, and a number of books/book chapters and patents. Dr. Wu has held key positions in and has served on various panels and international committees including the chair of technical program committees, international steering committees and international conferences/symposia. In particular, he will be the general chair of the 2012 IEEE MTT-S International Microwave Symposium. He has served on the editorial/review boards of many technical journals, transactions and letters as well as scientific encyclopedia including editors and guest editors. He has been providing consulting services to corporations, governments and universities around the world. Dr. Wu is an elected IEEE MTT-S AdCom member for 2006-2012 and serves as the chair of the IEEE MTT-S Member and Geographic Activities (MGA) Committee. He was the recipient of many awards and prizes including the first IEEE MTT-S Outstanding Young Engineer Award, the 2004 Fessenden Medal of the IEEE Canada and the 2009 Thomas W. Eadie Medal from the Royal Society of Canada (The Academies of Arts, Humanities and Sciences of Canada). He is a Fellow of the IEEE, a Fellow of the Canadian Academy of Engineering (CAE) and a Fellow of the Royal Society of Canada. He is an IEEE MTT-S Distinguished Microwave Lecturer from Jan. 2009 to Dec. 2011.