Guest Editorial

RF microelectromechanical systems (MEMS) is a new technology with a potential of resulting in very high-performance components at microwave and millimeter-wave frequencies. The essential idea is to use miniature mechanical devices and physical motion to achieve the function of a microwave switch or a variable capacitor. The high performance is due to the very low capacitance and contact resistance, which can be achieved using RF MEMS technology as compared to GaAs p-i-n diodes and field-effect transistors. In fact, it is possible to build RF MEMS switches with a figure-of-merit cutoff frequency of 30–80 THz, which is around 100$\times$ better than GaAs transistors. Also, varactors with a Q of 150 were demonstrated at 30 GHz and this is approximately 5$\times$ better than comparable devices using GaAs techniques. RF MEMS also describes the general field of high-Q micromachined inductors on silicon and glass wafers, although these devices are static in design and are not tunable.

This TRANSACTIONS' Special Issue on RF MEMS details the latest development in RF MEMS components and presents state-of-the-art switches, phase shifters, tunable filters, reconfigurable matching networks, low-noise oscillators, and reconfigurable antennas at microwave and millimeter-wave frequencies. Notice the absence of reliability and packaging papers in this Special Issue. We have not received a single submission in this area, showing that this particular expertise is not yet ready to be shared by the RF MEMS community. It is important to note that several companies and government laboratories have shown excellent reliability results (>50-billion switch cycles at low RF powers) and some companies have been successful in the hermetic packaging of RF MEMS switches and their subsequent test to billions of cycles. However, there is much work that still needs to be done in this area and this may be the subject of another special issue in the next two or three years.

We received 22 submissions and accepted 11 papers, which is slightly higher than the regular acceptance rate of this TRANSACTIONS. We thank our diligent reviewers who did a great job in such a short time (their names will not be shown since the number of papers is relatively small).

GABRIEL M. REBEIZ, *Co-Editor*
The University of Michigan at Ann Arbor
Electrical Engineering and Computer Science Department
Ann Arbor, MI 48109-2122 USA

LINDA P. B. KATEHI, *Co-Editor*
Purdue University
Office of the Dean of Engineering
West Lafayette, IN 47907-1280 USA

N. SCOTT BARKER, *Co-Editor*
University of Virginia
Electrical and Computer Engineering Department
Charlottesville, VA 22904-4743 USA

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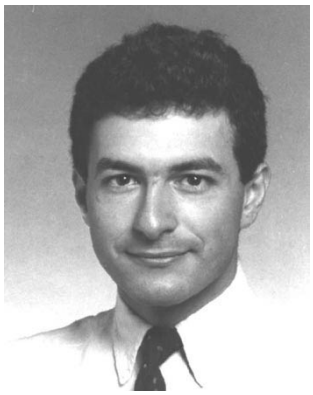


Gabriel M. Rebeiz (S'86–M'88–SM'93–F'97) received the Ph.D. degree in electrical engineering from the California Institute of Technology, Pasadena, in 1988.

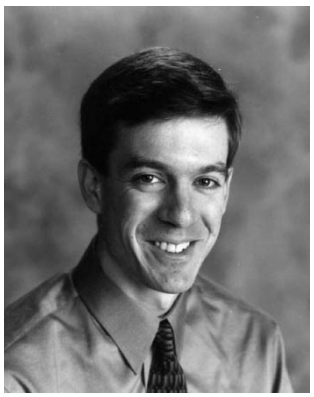
In September 1988, he joined the faculty of The University of Michigan at Ann Arbor, and was promoted to Full Professor in 1998. He held short visiting professorships with the Chalmers University of Technology, Göteborg, Sweden, Ecole Normale Superieur, Paris, France, and Tohoku University, Sendai, Japan. His research interests include applying micromachining techniques and MEMS for the development of novel components and subsystems for radars and wireless systems. He is also interested in Si/GaAs RF integrated circuit (RFIC) design for receiver applications, and in the development of planar antennas and microwave/millimeter-wave front-end electronics for communication systems, automotive collision-avoidance sensors, monopulse tracking systems, and phased arrays.

Prof. Rebeiz was the recipient of the 1991 National Science Foundation Presidential Young Investigator Award and the 1993 URSI International Isaac Koga Gold Medal Award for Outstanding International Research. He was also the recipient of the 1995 Research Excellence Award presented by The University of Michigan at Ann Arbor. Together with his students, he was the recipient of Best Student Paper Awards of the IEEE Microwave Theory and Techniques Society (IEEE MTT-S) (1992, 1999-1994), and the IEEE Antennas and Propagation Society (IEEE AP-S) (1992, 1995). He was also the recipient of the 1990 *Journées Int. de Nice sur les Antennes* (*JINA*) Best Paper Award, and the 1997 University of Michigan Electrical Engineering and Computer Science (EECS) Department Teaching Award. He was selected by his students as the 1997–1998 Eta Kappa Nu EECS Professor of the Year. He was also the recipient of the 1998 College of Engineering Teaching Award and the 1998 Amoco Foundation Teaching Award, given yearly to one faculty member of The University of Michigan at Ann Arbor for excellence in undergraduate teaching. He was the corecipient of the IEEE 2000 Microwave Prize for his work on MEMS phase shifters.

Linda P. B. Katehi (S'81–M'84–SM'89–F'95) received the B.S.E.E. degree from the National Technical University of Athens, Athens, Greece, in 1977, and the M.S.E.E. and Ph.D. degrees from the University of California at Los Angeles, in 1981 and 1984, respectively.

In September 1984, she joined the faculty of the Electrical Engineering and Computer Science Department, The University of Michigan at Ann Arbor, as an Assistant Professor, and then became an Associate Professor in 1989 and Professor in 1994. She has served in many administrative positions, including Director of Graduate Programs, College of Engineering (1995–1996), Elected Member of the College Executive Committee (1996–1998), Associate Dean For Graduate Education (1998–1999), and Associate Dean for Academic Affairs (since September 1999). She is currently the Dean of the Schools of Engineering, Purdue University, West Lafayette, IN. She has authored or coauthored 410 papers published in refereed journals and symposia proceedings and she holds four U.S. patents. She has also generated 20 Ph.D. students.

Dr. Katehi is a member of the IEEE Antennas and Propagation Society (IEEE AP-S), the IEEE Microwave Theory and Techniques Society (IEEE MTT-S), Sigma Xi, Hybrid Microelectronics, and URSI Commission D. She was a member of the IEEE AP-S AdCom (1992–1995). She was an associate editor for the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES and the IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION. She was the recipient of the 1984 IEEE AP-S W. P. King (Best Paper Award for a Young Engineer), the 1985 IEEE AP-S S. A. Schelkunoff Award (Best Paper Award), the 1987 National Science Foundation Presidential Young Investigator Award, the 1987 URSI Booker Award, the 1994 Humboldt Research Award, the 1994 University of Michigan Faculty Recognition Award, the 1996 IEEE MTT-S Microwave Prize, the 1997 International Microelectronics and Packaging Society (IMAPS) Best Paper Award, and the 2000 IEEE Third Millennium Medal.



N. Scott Barker (S'95–M'99) received the B.S.E.E. degree (with high distinction) from the University of Virginia, Charlottesville, in 1994, and the M.S.E.E. and Ph.D. degrees from The University of Michigan at Ann Arbor, in 1996 and 1999 respectively.

From 1999 to 2000, he was a Staff Scientist with the Naval Research Laboratory prior to joining the University of Virginia in December 2000, where he is currently an Assistant Professor. His research interests are the application of microfabrication techniques to microwave and millimeter-wave circuits.

Dr. Barker is a member of Eta Kappa Nu. He was a recipient of the IEEE Microwave Theory and Techniques Society (IEEE MTT-S) International Microwave Symposium (IMS) Best Student Paper Award in 1997 (second place) and 1999 (first place), as well as a corecipient of the 2000 Microwave Prize. He was also the recipient of the 1998 Outstanding Electrical Engineering Graduate Student Award.