

Introduction to the Special Section on the 2018 RFIC Symposium

THIS SPECIAL Section of the IEEE JOURNAL OF SOLID-STATE CIRCUITS covers expanded papers from the 2018 Radio Frequency Integrated Circuits Symposium (RFIC Symposium), which was held on June 10–12, 2018, in Philadelphia, PA, USA.

The RFIC Symposium is the world's premier conference focused on RF and millimeter-wave (mmWave) integrated circuits and systems technology. In addition to showcasing state-of-the-art high-frequency IC design techniques, the conference has evolved to encompass a wide range of emerging technologies and applications, including Internet of Things (IoT), optical phased arrays, and other innovations in terahertz-wave, sub-mmWave, and analog/mixed-signal ICs. The collection of papers in this Special Section reflects the diversity and multidisciplinary nature of the RFIC Symposium.

The twelve outstanding papers selected for publication in this Special Section of the Journal are extensions to their corresponding conference papers available in the 2018 RFIC Symposium conference digest, with additional materials including extensive mathematical analysis, in-depth presentation of the architecture and circuit concepts, and extra measurements and benchmark comparison data to the state-of-the-art.

Looking into the future of IC design and its applications in large-scale arrays, the first two papers highlight a 2-D large field-of-view (FOV) optical phased array and a 32-unit sub-mmWave receiver. Both papers address array scalability, signal distribution in dense arrays, and detailed design of basic building blocks in silicon photonics, as well as mainstream silicon technologies.



Mona Mostafa Hella (SM'16) received the Ph.D. degree in electrical engineering from The Ohio State University, Columbus, OH, USA, in 2001.

From 2001 to 2003, she was with RF Micro Devices Inc. (now Qorvo), Billerica, MA, USA, where she was involved in optical communication circuits and silicon-based wireless systems. She joined the Electrical, Computer and Systems Engineering Department, Rensselaer Polytechnic Institute, Troy, NY, USA, in 2004, where she is currently a Professor. She is the Sensors Thrust Leader for the National Science Foundation Engineering Research Center (ERC) on Light Enabled Systems and Applications (LESA). She has co-authored two books: *Power Management Integrated Circuits and Technologies* (CRC Press, Taylor and Francis Group, 2016) and *RF CMOS Power Amplifier, Theory, Design, and Implementation* (Kluwer Academic Publishers, 2002) and three book chapters, and has authored over 100 peer-reviewed conference and journal publications. Her research interests include the areas of millimeter-wave (mm-wave), THz circuits and systems, and integration platforms for sensing and energy harvesting

applications.

Dr. Hella served as an Associate Editor for the IEEE TRANSACTIONS ON VERY LARGE SCALE INTEGRATION from 2011 to 2014. She serves on the Technical Program Committee of the Radio Frequency Integrated Circuits (RFIC) Symposium, Midwest Symposium on Circuits and Systems (MWSCAS), and Optical Fiber Communication (OFC) Conference. She was on the Administrative Committee of the IEEE Microwave Theory and Techniques Society from 2007 to 2009 and was a Fulbright Scholar in 2015.

As the conference continues to honor its tradition of celebrating 5G systems with focused sessions on the coming technology, this Special Section includes several papers that cover 28-GHz CMOS phased-array transceivers (the first demonstration of 512-QAM constellation over 5-m distance at 28 GHz), high-efficiency outphasing transmitters incorporating multi-feed antennas, and ultra-low jitter phase-locked loop (PLL) architectures meeting the 5G cellular standards requirements in the 28/39-GHz bands.

The remaining papers cover mmWave power amplifiers (PAs) in 22-nm FinFET technology, digital PA architectures with linearity enhancement, integrated non-magnetic SOI circulators, beam-forming techniques, and various applications such as protected satellite communications and IoT.

On behalf of the RFIC Symposium Committee, we would like to extend special thanks to all the authors and reviewers of this Special Section. Thanks to their dedication and commitment to the highest technical quality, the IEEE JOURNAL OF SOLID-STATE CIRCUITS continues to be such an impactful publication. Special thanks go to Prof. Jan Craninckx, JSSC Editor-in-Chief, for his guidance, and to the JSSC administrators for their assistance. We hope the readers enjoy this Special Section of the IEEE JOURNAL OF SOLID-STATE CIRCUITS.

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