

FOREWORD

It is with a great pleasure that I present to you the 2011-2016 Research Report of the State Key Laboratory of Analog and Mixed-Signal VLSI (SKL-AMSV). It features the results and achievements of the whole team of collaborators that include academics, staff, students, postdocs and visiting scholars associated with SKL-AMSV during the referred period.

The mission of the SKL-AMSV is to advance world-state-of-the-art research, education and innovation in Electronics by establishing an excellent R&D platform in the area of analog and mixed-signal integrated circuits and systems that should meet the State (China) and international standards. Following our Motto: *Locally, from (World) Quality towards (National) Quantity*, we aimed at the importance of the close relationship between innovative IC research and the State's emerging growth of IT and technology development. Our original goals, in the initial period 2011-2013, were to setup the basic human and technical infrastructure to launch cutting-edge research projects important for the advance of various electronics systems in data conversion and signal processing, wireless communications, biomedical and integrated power electronics. Further, the original target of SKL-AMSV was to setup the State's most important silicon access center in advanced nanometer IC technologies, pointing at building-up a highly-qualified local technical (including software-design and hardware testing equipment platforms) and human infrastructure through training and cultivation at postgraduate level M.Sc. and Ph.D. candidates, as well as involving post-doctoral researchers in R&D projects with possible industrial applications, objectives that were clearly met.

In the second period from 2014-2016, we followed a consolidation and further integration of the research lines experiencing a fast and consistent growth placing SKL-AMSV at the frontier of state-of-the-art silicon chips in China, resulting into hundreds of papers in leading journals and conferences in the IEEE Solid-State Circuits Society (SSCS), Circuits and Systems Society, Microwave Theory and Techniques Society, plus the Royal Society of Chemistry, for the emerging area of Biochips. All of them are the topmost international societies that cover the field of integrated circuits and systems, and experimental results from real chips or microfluidic prototypes are essential for publication, thus ensuring its maturity and quality. Our most significant outcome has been the continuous contribution with 20 papers/chips to the IEEE International Solid State Circuits Conference (ISSCC) from 2011 to 2017, which is the flagship conference of the IEEE SSCS that serves as a premier forum, and the real world-benchmark conference, for presenting advances in solid-state circuits. Almost all chip-design breakthroughs from top companies like Intel, Analog Devices, Qualcomm, Broadcom, Texas Instruments, and top universities like MIT, Stanford, UCLA, UC Berkeley were firstly reported there for the first time.

Since its inception SKL-AMSV trained 6 Post-Doc Fellows, 18 Ph.Ds, 50+ M.Sc. and 60+ B.Sc students, published 7 Books, 130+ SCI Journal Papers, 180+ Conference Papers and holds now 25+ US Patents. Plus, 86 chips were designed, fabricated, and measured, with highly competitive state-of-the-art results, including the advanced 28nm CMOS process. Also, numerous awards were received locally (Macao), regionally (China) with the first S&T national award ever attributed to a local Macao research team, and internationally (USA). Furthermore, SKL-AMSV recruited 9 Assistant Professors, 2 UM Macao Fellows (with PhDs obtained @UM), 7 staff for administrative and technical support, including 1 for technology transfer. The development of SKL-AMSV will not only promise technological advances for Macao through state-of-the-art R&D, but also the devotion in the future to technology transfer in terms of application and commercialization of R&D results/Patents to industry. The developing of technical human resources and world-class innovative technologies will contemplate the forthcoming conversion into an Institute of Microelectronics - IME as well as the eventual emergence of spin-off companies to bring real industrial impact to cope with China's strategic development towards full-autonomy in IC design capability. In the future, we are confident that we can maintain our world-level state-of-the-art electronics status while expanding the commercialization activity. High-end measurement equipment and IT facilities were purchased to meet the needs of current and future developments, with the setup of a cleanroom to support R&D of Biochips and multidisciplinary research. On-going cooperation projects with advanced Chinese IC Design companies allows us to envisage the future with good perspectives following the trends defined in SKL-AMSV development plans.

Prof. Rui Martins
SKL-AMSV, Director
Macao, April 2017

