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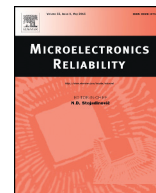

Editorial

Proceedings of the 28th European Symposium on the reliability of electron devices, failure physics and analysis

Bordeaux - France
September 25th–28th 2017

Organised by IMS Laboratory, University of Bordeaux

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This special issue of Microelectronics Reliability is devoted to the publication of the papers presented during the 28th European Symposium on Reliability of Electron Devices, Failure Physics and Analysis, ESREF 2017. The conference will be held in Bordeaux (France) from September 25th to September 28th, 2017.

This international symposium continues to focus on recent developments and future directions in Quality and Reliability Management of materials, devices and circuits for micro-, nano-, and optoelectronics. It provides a European forum for developing all aspects of reliability management and innovative analysis techniques for present and future electronic applications.

ESREF 2017 is held in Bordeaux – This South West French major town is the European capital for optical and laser engineering, with the so called “Laser Megajoule”, one of the most powerful lasers in the world. Some of the largest companies involved in aeronautic and aerospace industry are located around Bordeaux. Hosting ESREF 2017 in this rich environment is a great opportunity since reliability in these particular applications is a very hot topic with strong challenges such as zero ppm failure and harsh environments.

For this 28th edition, in addition to the core topics of the conference, we have involved the major actors of aeronautics, space and embedded systems industry to provide specific topics such as radiation hardening, very long-term reliability, high/low temperature challenges, obsolescence and counterfeit issues, wide band gap power devices for the more electric aircraft and other embedded system applications.

The Technical Programme of ESREF 2017 has been defined by the Technical Programme Committee (TPC) organised in nine sub-committees with more than 194 experts in the field of reliability of electronic devices and systems. The TPC has processed to a careful selection from 229 extended summaries of 92 papers to be presented during oral sessions and 38 as posters.

Afterwards, authors of accepted papers have carefully addressed the reviewer's comments in the manuscript submitted for this special issue and a strict reviewing of manuscripts has been implemented with the Elsevier Editorial System by two anonymous reviewers. The overall quality of this special issue has been improved thanks to the commitment and expertise of all contributors and to the editorial effort provided by the ESREF 2017 Guest Editor team and the Elsevier staff.

Accepted papers, from all around the world are covering the following topics:

Session A – Quality and Reliability assessment techniques and methods for Devices and Systems

Session B – Semiconductor Failure Mechanisms & Reliability: Defect analysis from devices to product, Circuit reliability analysis

Session C – Progress in Failure Analysis: Defect detection and analysis

Session D – Reliability of SiC devices, millimetre wave power devices and high power GaN devices

Session E – Interconnections and new failure modes

Session F - Power Devices Reliability and Failure Analysis: Interconnections, model and simulations, power devices and modules

Session G – Photonic devices Reliability

Session H – MEMS Reliability

Session I - Extreme environments: Ionising radiation, EMC, ESD, Electric Fast Transient

The main focus in 2017 is reliability assessment of embedded systems in harsh environments required by automotive, avionics and space applications.

On Monday September 25th, two tutorials are offered to allow attendees refreshing and expanding their knowledge on the following topics:

“Simulation of Packaging under Harsh Environment Conditions (Temperature, Pressure, Corrosion and Radiation)” by *Kirsten Weide-Zaage*, *RESRI Group*, *Institute of Microelectronic Systems* (*IMS*), *Leibniz Universität Hannover*

“The impacts of EMC/ESD on embedded systems: a challenge for safe systems achievement” by *Geneviève Duchamp*, *IMS Lab - Université de Bordeaux*, *Fabrice Caignet*, *LAAS-CNRS Toulouse*

Seven invited speakers who are recognised experts in their fields give an overview of the state-of-the-art and special focus on advanced research work. The key note speech opens the conference on Monday, September 25th. Each invited talk focuses on leading work in the areas of:

Key Note paper “Enabling robust automotive electronic components in advanced CMOS nodes” by *Vincent Huard* [a,*], *S. Mhira* [a,*], *F. Cacho*[a], *A. Bravaix*[*], [(a)] *STMicroelectronics*, *France*, [*] *REER*, *IM2NP-ISEN*, *CNRS*, *France*

“Review of the impact of microstructure of lead-free solder joints on assessment of fatigue lives of the solder joints by simulations and thermal cycling tests” by *Per-Erik Tegehall*, *Swerea IVF*, *Sweden*

“Aerospace trends are moving fast towards no more custom ICs to high reliability automotive solutions” by *R. Enrici Vaion*[(a)], *M. Medda*[(a)], *A. Pintus*[(a)], *A. Mancaleoni*[(a)], *G. Mura*[(b)], (*a*) *STMicroelectronics*, *Agrate Brianza*, (*b*) *University of Cagliari*

“Reconsideration of TDDB Reliability of Gate Dielectrics: Mechanisms and Statistics” by *Kenji Okada*, *TowerJazz Panasonic Semiconductor* (*TPSCo*), *Japan*

“Technologies of IoT - Challenges and Chances for Fault Isolation” by *Christian Boit*, *Technische Universität Berlin*, *Berlin*, *Germany*

“Reliability and Qualification of Microphotonics for Space Applications - A New Challenge” by *Iain McKenzie*, *ESTEC-European Space Agency*, *Noordwijck*, *The Netherlands*

A review of Vth instabilities in GaN MISHEMTs by *Clemens Ostermaier*, *Infineon Villach*, *Germany*

Based on an exchange agreement with the committees of the International Symposium on the Physical & Failure Analysis of Integrated Circuits Conference (IPFA 2017), the International Reliability Physics Symposium (IRPS 2017), the authors of awarded papers are invited to present their work at ESREF 2017. These exchanges prove the fruitful collaboration between the Committees of these three conferences.

According to its tradition, ESREF continues to provide an interactive forum to the participants to define the state-of-the-art of leading topics in the reliability field.

Several workshops organised in correlation with the ESREF 2017 committee give you a chance to hear about the vision and the roadmap of several key industries handling high TRL products, challenged by research laboratories and academics proposing low TRL innovative constructions.

- The ESREF-ECPE annual workshop on Power Devices is organised by Eckard Wolfgang (ECPE-Germany) and Mauro Ciappa (ETH Zürich-Switzerland) on Wednesday, September 27th. This edition focuses on “Advanced Packaging and Reliability for Power Devices used in Automotive, Avionics, Traction and Renewables".
- The workshop on "Emerging challenges for a built-in reliability in innovative Automotive ICs" is organised by Alberto Mancaleoni

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