Prof. Alessandro Spinelli

Dipartimento di Elettronica, Informazione e Bioingegneria
Politecnico di Milano, Milano, 20133 Italy

Phone: +39-02-2399-4001
Email: alessandro.spinelli@polimi.it
URL: http://home.deib.polimi.it/spinelli/
ORCID ID: 0000-0002-3290-6734

Born: August 23, 1966—Bergamo, Italy
Nationality: Italian

Current position

Full Professor, Politecnico di Milano

Research interests

Non-volatile memories; NAND Flash reliability.

Positions held

2006-2017 Full professor, Politecnico di Milano, Milano, Italy
2004-2006 Associate professor, Politecnico di Milano, Milano, Italy
1998-2004 Associate professor, University of Como, Como, Italy
1997-1998 Research assistant, Politecnico di Milano, Milano, Italy
1996 Consultant, STMicroelectronics, Agrate Brianza, Italy.

Education

1996 PhD in Electronics Engineering, Politecnico di Milano
1992 MSc in Electronics Engineering, Politecnico di Milano

Awards

2015 *Best poster award* at the IRPS conference
2014 *Best student paper award* at the IRPS conference
2013 *Best student paper award* at the IRPS conference
2012 *Best student paper award* at the IRPS conference
2008 *Outstanding paper award* at the IRPS conference

Best student paper award at the Biodevices conference
2007 *Senior member* of the IEEE

International patents

[3] S. Aritome, S. Wi, A. Visconti, S. Beltrami, C. Monzio Compagnoni, A. S. Spinelli, "Methods to operate a memory cell", US 2013/0033936 A1 (2013)

[2] S. Aritome, S. Wi, A. Visconti, S. Beltrami, C. Monzio Compagnoni, A. S. Spinelli, "Method for program verifying a memory cell and memory devices configured to perform the same", US 2013/0033937 A1 (2013)

[1] A. Visconti, M. Bonanomi, D. Ielmini, A. Spinelli, "Method for programming/erasing a non volatile memory cell device, in particular for Flash type memories", EP1833058A1, US 2007/0211534A1 (2007)

Publications & talks

Journal articles

[120] G. Pedretti, V. Milo, S. Ambrogio, R. Carboni, S. Bianchi, A. Calderoni, N. Ramaswamy, A. S. Spinelli and D. Ielmini, "Memristive neural network for on-line learning and tracking with brain-inspired spike timing dependent plasticity", *Sci. Rep.* **7**, 5288:1–5288:10 (2017). ISSN 20452322. doi 10.1038/s41598-017-05480-0

[119] C. Monzio Compagnoni, A. Goda, A. S. Spinelli, P. Feeley, A. L. Lacaita and A. Visconti, "Reviewing the evolution of the NAND Flash technology", *Proc. IEEE* **105**, 1609–1633 (2017). ISSN 0018-9219. doi 10.1109/JPROC.2017.2665781

[118] A. S. Spinelli, C. Monzio Compagnoni and A. L. Lacaita, "Reliability of NAND Flash memories: planar cells and emerging issues in 3D devices", *MDPI Computers* **6**, 1–55 (2017). ISSN 2073-431X. doi 10.3390/computers6020016

[117] D. Resnati, A. Goda, G. Nicosia, C. Miccoli, A. S. Spinelli and C. Monzio Compagnoni, "Temperature effects in NAND Flash memories: a comparison between 2-D and 3-D arrays", *IEEE Electron Dev. Lett* **38**, 461–464 (2017). ISSN 0741-3106. doi 10.1109/LED.2017.2675160

[116] G. Nicosia, C. Monzio Compagnoni, G. M. Paolucci, D. Resnati, C. Miccoli, A. S. Spinelli, A. L. Lacaita, A. Visconti and A. Goda, "Investigation of the program operation of NAND Flash cells with a single-electron resolution", *IEEE Trans. Electron Devices* **63**, 2360–2366 (2016). ISSN 0018-9383. doi 10.1109/TED.2016.2550660

[115] G. M. Paolucci, A. S. Spinelli, C. Monzio Compagnoni, and P. Tessariol, "A semi-analytical model for macaroni MOSFETs with application to vertical Flash memories", *IEEE Trans. Electron Devices* **63**, 1871–1876 (2016). ISSN 0018-9383. doi 10.1109/TED.2016.2543605

[114] G. M. Paolucci, M. Bertuccio, C. Monzio Compagnoni, S. Beltrami, A. S. Spinelli, A. L. Lacaita and A. Visconti, "Impact of the array background pattern on cycling-induced threshold voltage instabilities in nanoscale NAND Flash memories", *Solid-State Electron.* **113**, 138–143 (2015). ISSN 0038-1101.

[113] D. Resnati, C. Monzio Compagnoni, G. M. Paolucci, C. Miccoli, A. S. Spinelli, A. L. Lacaita, A. Visconti and A. Goda, "Random telegraph noise-induced sensitivity of data retention to cell position in the programmed distribution of NAND Flash memory arrays", *IEEE Electron Dev. Lett.* **36**, 678–680 (2015). ISSN 0741-3106

[112] D. Resnati, C. M. Compagnoni, H. Mulaosmanovic, N. Castellani, G. Carnevale, P. Fantini, D. Ventrice, A. L. Lacaita, A. S. Spinelli, A. Benvenuti, "Modeling of dynamic operation of T-RAM cells", *IEEE Trans. Electron Devices* **62**, 1905–1911 (2015). ISSN 0018-9383

[111] G. M. Paolucci, C. M. Compagnoni, A. S. Spinelli, A. L. Lacaita and A. Goda, "Fitting cells into a narrow V_T interval: physical constraints along the lifetime of an extremely scaled NAND Flash memory array", *IEEE Trans. Electron Devices* **62**, 1491–1497 (2015). ISSN 0018-9383

[110] H. Mulaosmanovic, C. M. Compagnoni, N. Castellani, G. M. Paolucci, G. Carnevale, P. Fantini, D. Ventrice, A. L. Lacaita, A. S. Spinelli and A. Benvenuti, "Investigation of the turn-ON of T-RAM cells under transient conditions", *IEEE Trans. Electron Devices* **62**, 1170–1176 (2015). ISSN 0018-9383

[109] C. Monzio Compagnoni, G. M. Paolucci, C. Miccoli, A. S. Spinelli, A. L. Lacaita, A. Visconti and A. Goda, "First detection of single-electron charging of the floating gate of NAND flash memory cells", *IEEE Electron Dev. Lett.* **36**, 132–134 (2015). ISSN 0741-3106

[108] H. Mulaosmanovic, G. M. Paolucci, C. Monzio Compagnoni, N. Castellani, G. Carnevale, P. Fantini, D. Ventrice, A. L. Lacaita, A. S. Spinelli and A. Benvenuti, "Working principles of a DRAM cell based on gated-thyristor bistability", *IEEE Electron Dev. Lett.* **35**, 921–923 (2014). ISSN 0741-3106

[107] G. M. Paolucci, C. Monzio Compagnoni, C. Miccoli, A. S. Spinelli, A. L. Lacaita, Fellow, and A. Visconti, "Revisiting charge trapping/detrapping in Flash memories from a discrete and statistical standpoint - part II: On-field operation and distributed-cycling effects", *IEEE Trans. Electron Devices* **61**, 2811–2819 (2014). ISSN 0018-9383

[106] G. M. Paolucci, C. Monzio Compagnoni, C. Miccoli, A. S. Spinelli, A. L. Lacaita, Fellow, and A. Visconti, "Revisiting charge trapping/detrapping in Flash memories from a discrete and statistical standpoint - part I: V_T instabilities", *IEEE Trans. Electron Devices* **61**, 2802–2810 (2014). ISSN 0018-9383

[105] G. Torrente, N. Castellani, A. Ghetti, C. Monzio Compagnoni, A. L. Lacaita, A. S. Spinelli, A. Benvenuti, "Investigation of the RTN amplitude statistics of nanoscale MOS devices by the statistical impedance field method", *J. Comput. Electron.* **12**, 585–591 (2013). ISSN 1569-8025

[104] A. Ghetti, C. Monzio Compagnoni, A. Calloni, L. Vendrame, A. S. Spinelli, and A. L. Lacaita, "Characterization and modeling of band-to-band current variability of nanoscale device junctions", *IEEE Trans. Electron Devices* **60**, 3291–3297 (2013). ISSN 0018-9383

[103] A. Maconi, C. Monzio Compagnoni, A. S. Spinelli, and A. L. Lacaita, "New erase constraint for the junction-less charge-trap memory array in cylindrical geometry", *IEEE Trans. Electron Devices* **60**, 2203–2208 (2013). ISSN 0018-9383

[102] C. Miccoli, C. Monzio Compagnoni, L. Chiavarone, S. Beltrami, A. L. Lacaita, A. S. Spinelli, and A. Visconti, "Reliability characterization issues for nanoscale Flash memories: a case study on 45-nm devices", **invited paper** *IEEE Trans. Dev. Mat. Reliab.* **13**, 362–369 (2013). ISSN 1530-4388

[101] S. M. Amoroso, C. Monzio Compagnoni, A. Ghetti, L. Gerrer, A. S. Spinelli, A. L. Lacaita, and Asen Asenov, "Investigation of the RTN distribution of nanoscale MOS devices from subthreshold to on-state", *IEEE Electron Dev. Lett.* **34**, 683-685 (2013). ISSN 0741-3106

[100] G. M. Paolucci, C. Monzio Compagnoni, N. Castellani, G. Carnevale, P. Fantini, D. Ventrice, A. L. Lacaita, A. S. Spinelli, and A. Benvenuti, "Dynamic analysis of current-voltage characteristics of nanoscale gated-thyristors", *IEEE Electron Dev. Lett.* **34**, 629-631 (2013). ISSN 0741-3106

[99] F. Adamu-Lema, C. Monzio Compagnoni, S. M. Amoroso, N. Castellani, L. Gerrer, S. Markov, A. S. Spinelli, A. L. Lacaita and A. Asenov, "Accuracy and issues of the spectroscopic analysis of RTN traps in nanoscale MOSFETs", *IEEE Trans. Electron Devices* **60**, 833–839 (2013). ISSN 0018-9383

[98] A. Bonfanti, M. Ceravolo, G. Zambra, R. Gusmeroli, G. Baranauskas, G. N. Angotzi, A. Vato, E. Maggiolini, M. Semprini, A. S. Spinelli and A. L. Lacaita, "A multi-channel low-power system-on-chip for in vivo recording and wireless transmission of neural spikes", *J. Low Power Electron. Appl.* **2**, 211–241 (2012). ISSN 2079-9268

[97] C. Monzio Compagnoni, N. Castellani, A. Mauri, A. S. Spinelli and A. L. Lacaita, "Three-dimensional electrostatics- and atomistic doping-induced variability of RTN time constants in nanoscale MOS devices – Part II: spectroscopic implications", *IEEE Trans. Electron Devices* **59**, 2495–2500 (2012). ISSN 0018-9383

[96] N. Castellani, C. Monzio Compagnoni, A. Mauri, A. S. Spinelli and A. L. Lacaita, "Three-dimensional electrostatics- and atomistic doping-induced variability of RTN time constants in nanoscale MOS devices – Part I: physical investigation", *IEEE Trans. Electron Devices* **59**, 2488–2494 (2012). ISSN 0018-9383

[95] G. M. Paolucci, C. Miccoli, C. Monzio Compagnoni, A. S. Spinelli and A. L. Lacaita, "String current in decananometer NAND Flash arrays: a compact-modeling investigation", *IEEE Trans. Electron Devices* **59**, 2331–2337 (2012). ISSN 0018-9383y

[94] A. S. Spinelli, C. Monzio Compagnoni, A. Maconi, S. M. Amoroso, and A. L. Lacaita, "Quantum-mechanical charge distribution in cylindrical gate-all-around MOS devices", *IEEE Trans. Electron Devices* **59**, 1837–1843 (2012). ISSN 0018-9383

[93] A. Maconi, A. Arreghini, C. Monzio Compagnoni, G. Van den Bosch, A. S. Spinelli, J. Van Houdt, A. L. Lacaita, "Comprehensive investigation of the impact of lateral charge migration on retention performance of planar and 3D SONOS devices", *Solid-State Electron.* **74**, 64–70 (2012). ISSN 0038-1101

[92] G. Baranauskas, E. Maggiolini, A. Vato, G. Angotzi, A. Bonfanti, G. Zambra, A. Spinelli, and L. Fadiga, "Origins of $1/f^2$ scaling in the power spectrum of inrtacortical local field potential", *J. Neurophysiol.* **107**, 984–994 (2012). ISSN 0022-3077

[91] S. M. Amoroso, C. Monzio Compagnoni, A. Mauri, A. Maconi, A. S. Spinelli, and A. L. Lacaita, "Semi-analytical model for the transient operation of gate-all-around charge-trap memories" *IEEE Trans. Electron Devices* **58**, 3116–3123 (2011). ISSN 0018-9383

[90] C. Miccoli, C. Monzio Compagnoni, S. Beltrami, A. S. Spinelli, and A. Visconti, "Threshold-voltage instability due to damage recovery in nanoscale NAND Flash memories", *IEEE Trans. Electron Devices* **58**, 2406–2414 (2011). ISSN 0018-9383

[89] A. Spessot, C. Monzio Compagnoni, F. Farina, A. Calderoni, A. S. Spinelli, and P. Fantini, "Compact modeling of variability effects in nanoscale NAND Flash memories", *IEEE Trans. Electron Devices* **58**, 2302–2309 (2011). ISSN 0018-9383

[88] A. Bonfanti, G. Zambra, G. Baranauskas, G. N. Angotzi, E. Maggiolini, M. Semprini, A. Vato, L. Fadiga, A. S. Spinelli, A. L. Lacaita, "A wireless microsystem with digital data compression for neural spike recording", *Microelectron. Eng.* **88**, 1672–1675 (2011). ISSN 0167-9317

[87] A. Maconi, S. M. Amoroso, C. Monzio Compagnoni, A. Mauri, A. S. Spinelli, and A. L. Lacaita, "Three-dimensional simulation of charge-trap memory programming – Part II: variability", *IEEE Trans. Electron Devices* **58**, 1872–1878 (2011). ISSN 0018-9383

[86] S. M. Amoroso, A. Maconi, A. Mauri, C. Monzio Compagnoni, A. S. Spinelli, and A. L. Lacaita, "Three-dimensional simulation of charge-trap memory programming – Part I: average bahavior", *IEEE Trans. Electron Devices* **58**, 1864–1871 (2011). ISSN 0018-9383

[85] A. Mauri, S. M. Amoroso, C. Monzio Compagnoni, A. Maconi, and A. S. Spinelli, "Comprehensive numerical simulation of threshold-voltage transients in nitride memories", *Solid-State Electron.* **56**, 23–30 (2011). ISSN 0038-1101

[84] G. Ghidini, N. Galbiati, E. Mascellino, C. Scozzari, A. Sebastiani, S. Amoroso, C. Monzio Compagnoni, A. S. Spinelli, A. Maconi, R. Piagge, A. Del Vitto, M. Alessandri, I. Baldi, E. Moltrasio, G. Albini, A. Grossi, P. Tessariol, E. Camerlenghi, and A. Mauri, "Charge retention phenomena in charge transfer silicon nitride: impact of

technology and operating conditions", *J. Vac. Sci. Technol. B* **29**, 01AE01-1–01AE01-4 (2011). ISSN 1071-1023

[83] C. Miccoli, C. Monzio Compagnoni, S. M. Amoroso, A. Spessot, P. Fantini, A. Visconti, and A. S. Spinelli, "Impact of neutral threshold-voltage spread and electron-emission statistics on data retention of nanoscale NAND Flash memories", *IEEE Electron Dev. Lett.* **31**, 1202–1204 (2010). ISSN 0741-3106

[82] C. Monzio Compagnoni, C. Miccoli, A. L. Lacaita, A. Marmiroli, A. S. Spinelli, and A. Visconti, "Impact of control-gate and floating-gate design on the electron injection spread of decananometer NAND Flash memories", *IEEE Electron Dev. Lett.* **31**, 1196–1198 (2010). ISSN 0741-3106

[81] C. Monzio Compagnoni, A. Mauri, S. M. Amoroso, A. Maconi, E. Greco, A. S. Spinelli and A. L. Lacaita, "Comprehensive investigation of statistical effects in nitride memories – Part II: scaling analysis and impact on device performance", *IEEE Trans. Electron Devices* **57**, 2124–2131 (2010). ISSN 0018-9383

[80] A. Mauri, C. Monzio Compagnoni, S. M. Amoroso, A. Maconi, A. Ghetti, A. S. Spinelli and A. L. Lacaita, "Comprehensive investigation of statistical effects in nitride memories – Part I: physics-based modeling", *IEEE Trans. Electron Devices* **57**, 2116–2123 (2010). ISSN 0018-9383

[79] C. Monzio Compagnoni, L. Chiavarone, M. Calabrese, M. Ghidotti, A. L. Lacaita, A. S. Spinelli and A. Visconti, "Fundamental limitations to the width of the programmed V_T distribution of NOR Flash memories", *IEEE Trans. Electron Devices* **57**, 1761–1767 (2010). ISSN 0018-9383

[78] A. Spessot, C. Monzio Compagnoni, F. Farina, A. Calderoni, A. S. Spinelli and P. Fantini, "Effect of floating-gate polysilicon depletion on the erase efficiency of NAND Flash memories", *IEEE Electron Dev. Lett.* **31**, 647–649 (2010). ISSN 0741-3106

[77] C. Monzio Compagnoni, A. Ghetti, M. Ghidotti, A. S. Spinelli and A. Visconti, "Data retention and program/erase sensitivity to the array background pattern in deca-nanometer NAND Flash memories", *IEEE Trans. Electron Devices* **57**, 321–327 (2010). ISSN 0018-9383

[76] C. Monzio Compagnoni, M. Ghidotti, A. L. Lacaita, A. S. Spinelli and A. Visconti, "Random telegraph noise effect on the programmed threshold-voltage distribution of Flash memories", *IEEE Electron Dev. Lett.* **30**, 984–986 (2009). ISSN 0741-3106

[75] C. Monzio Compagnoni, A. Mauri, S. M. Amoroso, A. Maconi and A. S. Spinelli, "Physical modeling for programming of TANOS memories in the Fowler-Nordheim regime", *IEEE Trans. Electron Devices* **56**, 2008–2015 (2009). ISSN 0018-9383

[74] A. Ghetti, C. Monzio Compagnoni, A. S. Spinelli and A. Visconti, "Comprehensive analysis of random telegraph noise instability and its scaling in deca-nanometer Flash memories", *IEEE Trans. Electron Devices* **56**, 1746–1752 (2009). ISSN 0018-9383

[73] C. Monzio Compagnoni, R. Gusmeroli, M. Ghidotti, A. S. Spinelli and A. Visconti, "Investigation of the electron-injection spread in barrier-engineered NAND Flash memories", *IEEE Electron Dev. Lett.* **30**, 769–771 (2009). ISSN 0741-3106

[72] C. Monzio Compagnoni, R. Gusmeroli, A. S. Spinelli and A. Visconti, "Analytical model for the electron-injection statistics during programming of nanoscale NAND Flash memories", *IEEE Trans. Electron Devices* **55**, 3192–3199 (2008). ISSN 0018-9383

[71] C. Monzio Compagnoni, A. S. Spinelli, R. Gusmeroli, S. Beltrami, A. Ghetti and A. Visconti, "Ultimate accuracy for the NAND Flash program algorithm due to the electron injection statistics", *IEEE Trans. Electron Devices* **55**, 2695–2702 (2008). ISSN 0018-9383

[70] C. Monzio Compagnoni, A. S. Spinelli, S. Beltrami, M. Bonanomi and A. Visconti, "Cycling effect on the random telegraph noise instabilities of NOR and NAND Flash arrays", *IEEE Electron Dev. Lett.* **29**, 941–9443 (2008). ISSN 0741-3106

[69] A. S. Spinelli, C. Monzio Compagnoni, R. Gusmeroli, M. Ghidotti and A. Visconti, "Investigation of the random telegraph noise instability in scaled Flash memory arrays", *Jap. J. Appl. Phys.* **47**, 2598–2601 (2008). ISSN 0021-4922

[68] C. Monzio Compagnoni, R. Gusmeroli, A. S. Spinelli and A. Visconti, "RTN V_T instability from the stationary trap-filling condition: an analytic spectroscopic investigation", *IEEE Trans. Electron Devices* **55**, 655–661 (2008). ISSN 0018-9383

[67] C. Monzio Compagnoni, R. Gusmeroli, A. S. Spinelli, A. L. Lacaita, M. Bonanomi and A. Visconti, "Statistical model for random telegraph noise in Flash memories", *IEEE Trans. Electron Devices* **55**, 388–395 (2008). ISSN 0018-9383

[66] R. Gusmeroli, C. Monzio Compagnoni and A. S. Spinelli, "Statistical constraints in nanocrystal memory scaling", *Microelectron. Eng.* **84**, 2869–2874 (2007). ISSN 0167-9317

[65] C. Monzio Compagnoni, A. S. Spinelli and A. L. Lacaita, "Experimental study of data retention in nitride memories by temperature and field acceleration", *IEEE Electron Device Lett.* **28**, 628–630 (2007). ISSN 0741-3106

[64] T. Borghi, R. Gusmeroli, A. S. Spinelli, G. Baranauskas, "A simple method for efficient spike detection in multiunit recordings", *J. Neurosci. Methods* **163**, 176–180 (2007). ISSN 0165-0270

[63] C. Monzio Compagnoni, R. Gusmeroli, D. Ielmini, A. S. Spinelli, and A. L. Lacaita, "Silicon nanocrystal memories: a status update", **invited paper**, *J. Nanosci. Nanotechnol.* **7**, 193–205 (2007). ISSN 1533-4880

[62] P. Palestri, N. Barin, D. Brunel, C. Busseret, A. Campera, P. A. Childs, F. Driussi, C. Fiegna, G. Fiori, R. Gusmeroli, G. Iannaccone, M. Karner, H. Kosina, A. L. Lacaita, E. Langer, B. Majkusiak, C. Monzio Compagnoni, A. Poncet, E. Sangiorgi, L. Selmi, A. S.

Spinelli and J. Walczak, "Comparison of modeling approaches for the capacitance-voltage and current-voltage characteristics of advanced gate stacks", *IEEE Trans. Electron Devices* **54**, 106–114 (2007). ISSN 0018-9383

[61] G. Baranauskas, R. Gusmeroli, A. S. Spinelli, C. Giordano, M. T. Raimondi, "Cell-based biosensors: current trends of the development", *J. Appl. Biomat. Biomech.* **4**, 125–134 (2006). ISSN 1724-6024

[60] C. Monzio Compagnoni, A. S. Spinelli, A. Bianchini, A. L. Lacaita, S. Spiga, G. Scarel, C. Wiemer and M. Fanciulli, "Temperature dependence of transient and steady-state gate currents in HFO_2 capacitors", *Appl. Phys. Lett.* **89**, 103504-1–103504-3 (2006). ISSN 0003-6951

[59] C. Monzio Compagnoni, A. S. Spinelli, A. Bianchini, A. L. Lacaita, S. Spiga and M. Fanciulli, "Characterization of transient currents in HfO_2 in the short timescale", *Microelectron. Eng.* **83**, 1927–1930 (2006). ISSN 0167-9317

[58] R. Gusmeroli and A. S. Spinelli, "Accurate boundary integral calculation in semiconductor device simulation", *IEEE Trans. Electron Devices* **53**, 1730–1733 (2006). ISSN 0018-9383

[57] R. Gusmeroli, A. S. Spinelli, C. Monzio Compagnoni and D. Ielmini, "Threshold voltage statistics and conduction regimes in nanocrystal memories", *IEEE Electron Device Lett.* **27**, 409–411 (2006). ISSN 0741-3106

[56] D. Ielmini, A. Ghetti, A. S. Spinelli and A. Visconti, "Study of hot-hole injection during programming drain disturb in Flash memories", *IEEE Trans. Electron Devices* **53**, 668–676 (2006). ISSN 0018-9383

[55] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli and A. L. Lacaita, "Extraction of the floating-gate capacitive couplings for drain turn-on estimation in discrete-trap memories", *Microelectron. Eng.* **83**, 319–322 (2006). ISSN 0167-9317

[54] D. Ielmini, A. S. Spinelli and A. Visconti, "Characterization of oxide trap energy by analysis of the SILC roll-off regime in Flash memories", *IEEE Trans. Electron Devices* **53**, 126–134 (2006). ISSN 0018-9383

[53] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli and A. L. Lacaita, "Optimization of threshold voltage window under tunneling program/erase in nanocrystal memories", *IEEE Trans. Electron Devices* **52**, 2473–2481 (2005). ISSN 0018-9383

[52] M. Cioffi, C. Giordano, R. Gusmeroli, M. T. Raimondi, A. S. Spinelli and G. Baranauskas, "Integrating live cells with semiconductor devices: a biocompatibility assay", *J. Appl. Biomat. and Biomech.* **3**, 112–116 (2005). ISSN 1724-6024

[51] D. Ielmini, A. S. Spinelli and A. L. Lacaita, "Recent developments on Flash memory reliability", **invited paper**, *Microelectron. Eng.* **80C**, 321–328 (2005). ISSN 0167-9317

[50] R. Gusmeroli, A. S. Spinelli, C. Monzio Compagnoni, D. Ielmini and A. L. Lacaita, "Edge and percolation effects on V_T window in nanocrystal memories", *Microelectron. Eng.* **80C**, 186–189 (2005). ISSN 0167-9317

[49] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli and A. L. Lacaita, "Modeling of tunneling P/E for nanocrystal memories", *IEEE Trans. Electron Devices* **52**, 569–576 (2005). ISSN 0018-9383

[48] R. Gusmeroli, A. S. Spinelli, A. Pirovano, A. L. Lacaita, F. Bœuf and T. Skotnicki, "Optimization of the nonoverlap length in decanano MOS devices with 2-D QM simulations", *IEEE Trans. Electron Devices* **51**, 1849–1855 (2004). ISSN 0018-9383

[47] G. Puzzilli, D. Caputo, F. Irrera, C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita and C. Gerardi, "Improving floating-gate memory reliability by nanocrystal storage and pulsed tunnel programming", *IEEE Trans. Dev. Mat. Reliab.* **4**, 390–396 (2004)

[46] D. Ielmini, A. S. Spinelli, A. L. Lacaita and M. J. van Duuren, "A comparative study of characterization techniques for oxide reliability in Flash memories", *IEEE Trans. Dev. Mat. Reliab.* **4**, 320–326 (2004)

[45] D. Ielmini, A. S. Spinelli, A. L. Lacaita and M. J. van Duuren, "Impact of correlated generation of oxide defects on SILC and breakdown distribution", *IEEE Trans. Electron Devices* **51**, 1281–1287 (2004). ISSN 0018-9383

[44] D. Ielmini, A. S. Spinelli, A. L. Lacaita and M. J. van Duuren, "Defect generation statistics in thin gate oxides", *IEEE Trans. Electron Devices* **51**, 1288–1295 (2004). ISSN 0018-9383

[43] G. Zambra, M. Bondani, A. S. Spinelli, F. Paleari and A. Andreoni, "Counting photoelectrons in the response of a photomultiplier tube to single picosecond light pulses", *Rev. Sci. Instrum.* **75**, 2762–2765 (2004). ISSN 0034-6748

[42] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita and C. Gerardi, "Study of nanocrystal memory reliability by CAST structures", *Solid-State Electron.* **48**, 1497–1502 (2004). ISSN 0038-1101

[41] A. Andreoni, M. Bondani, A. Brega, F. Paleari, A. S. Spinelli and G. Zambra, "Detection of nondelayed photons in the forward-scattering of picosecond pulses", *Appl. Phys. Lett.* **84**, 2457–2459 (2004). ISSN 0003-6951

[40] M. Bondani, D. Redaelli, A. Spinelli, A. Andreoni, G. Roberti, P. Riccio, R. Liuzzi and I. Rech, "Photon time-of-flight distribution through turbid media directly measured with single-photon avalanche diodes", *J. Opt. Soc. Am. B* **20**, 2383–2388 (2003). ISSN 0740-3224

[39] A. Andreoni, M. Bondani, M. Bonesini, F. Ferri, D. Gibin, P. Govoni, A. Guglielmi, A. Menegolli, M. Paganoni, F. Paleari, A. Parravicini, A. S. Spinelli and A. Tonazzo, "The laser calibration system of the HARP TOF", in *Nucl. Phys. B - Proc. Supplement* **125**, 32–36 (2003). ISSN 0920-5632

[38] M. Bonesini, F. Ferri, P. Govoni, M. Paganoni, A. Parravicini, A. Tonazzo, A. Andreoni, M. Bondani, F. Paleari, A. S. Spinelli, D. Gibin, A. Guglielmi and A. Menegolli, "Laser-based calibration for the HARP time of flight system", *IEEE Trans. Nucl. Science* **50**, 1053–1058 (2003). ISSN 0018-9499

[37] D. Ielmini, A. S. Spinelli, A. L. Lacaita and A. Modelli, "A statistical model for SILC in Flash memories", *IEEE Trans. Electron Devices* **49**, 1955–1961 (2002). ISSN 0018-9383

[36] E. Viganò, A. Ghetti, G. Ghidini and A. S. Spinelli, "Post-breakdown characterization in thin gate oxides", *Microel. Reliab.* **42**, 1491–1496 (2002). ISSN 0026-2714

[35] D. Ielmini, A. S. Spinelli, A. L. Lacaita and A. Modelli, "Modeling of anomalous SILC in flash memories based on tunneling at multiple defects", *Solid State Electron.* **46**, 1749–1746 (2002). ISSN 0038-1101

[34] D. Ielmini, A. S. Spinelli, A. L. Lacaita and A. Visconti, "Statistical profiling of SILC spot in Flash memories", *IEEE Trans. Electron Devices* **49**, 1723–1728 (2002). ISSN 0018-9383

[33] A. S. Spinelli, R. Clerc and G. Ghibaudo, "An analytical model for flat-band polysilicon quantization in MOS devices", *IEEE Trans. Electron Devices* **49**, 1314–1316 (2002). ISSN 0018-9383

[32] A. S. Spinelli, A. Pacelli and A. L. Lacaita, "Simulation of polysilicon quantization and its effect on n- and p-MOSFET performance", *Solid State Electron.* **46**, 423–428 (2002). ISSN 0038-1101

[31] D. Ielmini, A. S. Spinelli, A. L. Lacaita and G. Ghidini, "Modeling of stress-induced leakage current and impact ionization in MOS devices", *Solid State Electron.* **46**, 417–422 (2002). ISSN 0038-1101

[30] R. Clerc, A. S. Spinelli, G. Ghibaudo and G. Pananakakis, "Theory of direct tunneling current in metal-oxide-semiconductor structures", *J. Appl. Phys.* **91**, 1400–1409 (2002). ISSN 0021-8979

[29] A. Pirovano, A. L. Lacaita and A. S. Spinelli, "Two-dimensional quantum effects in nanoscale MOSFET's", *IEEE Trans. Electron Devices* **49**, 25–31 (2002). ISSN 0018-9383

[28] D. Ielmini, A. S. Spinelli, A. L. Lacaita and A. Modelli, "Equivalent cell approach for extraction of the SILC distribution in Flash EEPROM cells", *IEEE Electron Dev. Lett.* **23**, 40–42 (2002). ISSN 0741-3106

[27] D. Ielmini, A. S. Spinelli, A. L. Lacaita and A. Modelli, "A new two-trap tunneling model for the anomalous SILC in Flash memories", *Microelectron. Eng.* **59**, 189–195 (2001). ISSN 0167-9317

[26] D. Ielmini, A. S. Spinelli, A. L. Lacaita, D. J. DiMaria and G. Ghidini, "A detailed investigation of the quantum yield experiment", *IEEE Trans. Electron Devices* **48**, 1696–1702 (2001). ISSN 0018-9383

[25] D. Ielmini, A. S. Spinelli, A. L. Lacaita, A. Martinelli and G. Ghidini, "A recombination- and trap-assisted tunneling model for stress-induced leakage current", *Solid-State Electron.* **45**, 1361–1369 (2001). ISSN 0038-1101

[24] R. Clerc, A. S. Spinelli, G. Ghibaudo, C. Leroux and G. Pananakakis, "Electrical characterization and quantum modeling of MOS capacitors with ultra-thin oxides (1.4-3 nm)", *Microel. Reliab.* **41**, 1027–1030 (2001). ISSN 0026-2714

[23] A. S. Spinelli, A. Pacelli and A. L. Lacaita, "An improved formula for the determination of the polysilicon doping", *IEEE Electron Dev. Lett.* **22**, 281–283 (2001). ISSN 0741-3106

[22] D. Ielmini, A. S. Spinelli, M. Beretta and A. L. Lacaita, "Different types of defects in silicon dioxide characterized by their transient behavior", *J. Appl. Phys.* **89**, 4189–4191 (2001). ISSN 0021-8979

[21] A. S. Spinelli, A. Pacelli and A. L. Lacaita, "Polysilicon quantization effects on the electrical properties of MOS transistors", *IEEE Trans. Electron Devices* **47**, 2366–2371 (2000). ISSN 0018-9383

[20] D. Ielmini, A. S. Spinelli, M. A. Rigamonti and A. L. Lacaita, "Modeling of SILC based on electron and hole tunneling – Part II: Steady-state", *IEEE Trans. Electron Devices* **47**, 1266–1272 (2000). ISSN 0018-9383

[19] D. Ielmini, A. S. Spinelli, M. A. Rigamonti and A. L. Lacaita, "Modeling of SILC based on electron and hole tunneling – Part I: Transient effects", *IEEE Trans. Electron Devices* **47**, 1258–1265 (2000). ISSN 0018-9383

[18] D. Ielmini, A. S. Spinelli, A. L. Lacaita, A. Martinelli and G. Ghidini, "A recombination model for transient and stationary stress-induced leakage current", *Microel. Reliab.* **40**, 703–706 (2000). ISSN 0026-2714

[17] D. Ielmini, A. S. Spinelli and A. L. Lacaita, "Experimental evidence for recombination-assisted leakage in thin oxides", *Appl. Phys. Lett.* **76**, 1719–1721 (2000). ISSN 0003-6951

[16] A. S. Spinelli, A. L. Lacaita, M. Rigamonti, D. Ielmini and G. Ghidini, "Separation of electron and hole traps by transient current analysis", *Microel. Eng.* **48**, 151–154 (1999). ISSN 0167-9317

[15] A. S. Spinelli, A. Benvenuti, S. Villa and A. Lacaita, "MOSFET simulation with quantum effects and non-local mobility model", *IEEE Electron Dev. Lett.* **20**, 298–300 (1999). ISSN 0741-3106

[14] A. S. Spinelli, A. L. Lacaita, M. Rigamonti and G. Ghidini, "Experimental method for the determination of the energy distribution of stress-induced oxide traps", *IEEE Electron Dev. Lett.* **20**, 106–108 (1999). ISSN 0741-3106

[13] A. Pacelli, A. S. Spinelli and L. M. Perron, "Carrier quantization at flat bands in MOS devices", *IEEE Trans. Electron Devices* **46**, 383–387 (1999). ISSN 0018-9383

[12] A. S. Spinelli, A. L. Lacaita, D. Minelli and G. Ghidini, " Analysis of space and energy distribution of stress-induced oxide traps", *Microel. Reliab.* **39**, 215–219 (1999). ISSN 0026-2714

[11] A. Spinelli, M. Ghioni, S. Cova and L. M. Davis, "Avalanche detector with ultra-clean response for time-resolved photon counting", *IEEE J. Quantum Electron.* **34**, 817–821 (1998). ISSN 0018-9197

[10] A. S. Spinelli, A. Benvenuti and A. Pacelli, "Self-consistent 2D model for quantum effects in n-MOS transistor", *IEEE Trans. Electron Devices* **45**, 1342–1349 (1998). ISSN 0018-9383

[9] A. Pacelli, A. S. Spinelli and A. L. Lacaita, "Impact ionization in silicon: a microscopic view", *J. Appl. Phys.* **83**, 4760–4764 (1998). ISSN 0021-8979

[8] A. Pacelli, A. L. Lacaita, A. Spinelli and R. Bez, "Effect of N_2O-nitridation on the electrical properties of MOS gate oxides", *Microel. Reliab.* **38**, 239–242 (1998). ISSN 0026-2714

[7] A. Spinelli and A. L. Lacaita, "Physics and numerical simulation of single photon avalanche diodes", *IEEE Trans. Electron Devices* **44**, 1931–1943 (1997). ISSN 0018-9383

[6] A. Spinelli, A. Pacelli and A. L. Lacaita, "Dead space approximation for impact ionization in silicon", *Appl. Phys. Lett.* **69**, 3707–3709 (1996). ISSN 0003-6951 qqq

[5] A. Spinelli, L. M. Davis, and H. Dautet, "Actively quenched single-photon avalanche diode for high repetition rate time-gated photon counting", *Rev. Sci. Instrum.* **67**, 55–61 (1996). ISSN 0034-6748

[4] A. Spinelli, A. L. Lacaita, "Mean gain of avalanche photodiodes in a dead space model", *IEEE Trans. Electron Devices* **43**, 23–30 (1996). ISSN 0018-9383

[3] A. Lacaita, A. Spinelli, and S. Longhi, "Avalanche transients in shallow $p-n$ junctions biased above breakdown", *Appl. Phys. Lett.* **67**, 2627–2629 (1995). ISSN 0003-6951

[2] A. Spinelli, L. Colombo, "Growth and structural characterization of thin Ge films by molecular dynamics simulation", *Mat. Sci. Eng.* **B26**, 61–65 (1994). ISSN 0921-5107

[1] A. Lacaita, S. Cova, A. Spinelli, and F. Zappa, "Photon-assisted avalanche spreading in reach-through photodiodes", *Appl. Phys. Lett.* **62**, 606–608 (1993). ISSN 0003-6951

Conference Proceedings

[77] D. Resnati, C. Monzio Compagnoni, G. M. Paolucci, C. Miccoli, J. Barber, M. Bertuccio, S. Beltrami, A. L. Lacaita, A. S. Spinelli A. Visconti, "A step ahead toward a new microscopic picture for charge trapping/detrapping in Flash memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 6C.3.1-6C.3.7 (2016). ISBN 978-1-4673-9137-5. doi 10.1109/IRPS.2016.7574569

[76] G. Nicosia, G. M. Paolucci, C. Monzio Compagnoni, D. Resnati, C. Miccoli, A. S. Spinelli, A. L. Lacaita, A. Visconti, "A single-electron analysis of NAND Flash memory programming", IEDM Tech. Dig., IEEE inc., Piscataway, NJ, 14.8.1-14.8.4 (2015). ISBN 978-1-4673-9894-7

[75] A. S. Spinelli, P. Minotti, G. Laghi, G. Langfelder, A. L. Lacaita and D. Paci, "Simple model for the performance of realistic AMR magnetic field sensors", Proc. Transducers 2015, IEEE Inc., Piscataway, NJ, 2204–2207 (2015). ISBN 978-1-4799-8955-3

[74] C. Miccoli, G. M. Paolucci, C. Monzio Compagnoni, A. S. Spinelli and A. Goda, "Cycling pattern and read/bake conditions dependence of random telegraph noise in decananometer NAND Flash arrays", Proc. IRPS, IEEE Inc., Piscataway, NJ, MY.9.1-MY.9.6 (2015). ISBN 978-1-4673-7362-3. **Best poster award**.

[73] G. M. Paolucci, M. Bertuccio, C. Monzio Compagnoni, S. Beltrami, A. S. Spinelli, A. L. Lacaita and A. Visconti, "Cycling-induced threshold voltage instabilities in nanoscale NAND Flash memories: sensitivity to the array background pattern", Proc. ESSDERC, IEEE Inc., Piscataway, NJ, 54–57 (2014). ISBN 978-1-4799-4376-0

[72] H. Mulaosmanovic, C. Monzio Compagnoni, N. Castellani, G. Carnevale, D. Ventrice, P. Fantini, A. S. Spinelli, A. L. Lacaita and A. Benvenuti, "Data regeneration and read disturb immunity of T-RAM cells", Proc. ESSDERC, IEEE Inc., Piscataway, NJ, 46–49 (2014). ISBN 978-1-4799-4376-0

[71] H. Mulaosmanovic, G. M. Paolucci, C. Monzio Compagnoni, N. Castellani, G. Carnevale, P. Fantini, D. Ventrice, S. Viganò, Anna M. Conti, N. Righetti, A. S. Spinelli, A. L. Lacaita, A. Benvenuti and A. Grossi, "Reliability investigation of T-RAM cells for DRAM applications", Proc. IRPS, IEEE Inc., Piscataway, NJ, MY.8.1–MY.8.4 (2014). ISBN 978-1-4799-3317-4

[70] G. M. Paolucci, C. Monzio Compagnoni, C. Miccoli, M. Bertuccio, S. Beltrami, J. Barber, J. Kessenich, A. L. Lacaita, A. S. Spinelli, and A. Visconti, "A new spectral approach to modeling charge trapping/detrapping in NAND Flash memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 2E.2.1–2E.2.6 (2014). ISBN 978-1-4799-3317-4. **Best student paper award**.

[69] G. Torrente, N. Castellani, A. Ghetti, C. Monzio Compagnoni, A. L. Lacaita, A. S. Spinelli, A. Benvenuti, "Assessment of the statistical impedance field method for the analysis of the RTN amplitude in nanoscale MOS devices", Proc. SISPAD, IEEE Inc., Piscataway, NJ, 21–24 (2013). ISBN 978-1-4673-5736-4

[68] M. Calabrese, C. Miccoli, C. Monzio Compagnoni, L. Chiavarone, S. Beltrami, A. Parisi, S. Bartolone, A. L. Lacaita, A. S. Spinelli, A. Visconti, "Accelerated reliability testing of Flash memory: accuracy and issues on a 45 nm NOR technology", Proc. ICICDT, IEEE Inc., Piscataway, NJ, 37–40 (2013). ISBN 978-1-4673-3. **Invited paper**.

[67] C. Miccoli, J. Barber, C. Monzio Compagnoni, G. M. Paolucci, J. Kessenich, A. L. Lacaita, A. S. Spinelli, R. J. Koval and A. Goda, "Resolving discrete emission events: a

new perspective for detrapping investigation in NAND Flash memories", **best student paper award**, Proc. IRPS, IEEE Inc., Piscataway, NJ, 3.B.1.1-3.B.1.6 (2013). ISBN 978-1-4799-0113-5

[66] A. Ghetti, C. Monzio Compagnoni, L. Digiacomo, L. Vendrame, A. S. Spinelli, A. L. Lacaita, "Evidence for an atomistic-doping induced variability of the band-to-band leakage current of nanoscale device junctions", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 30.3.1–30.3.4 (2012). ISBN 978-1-4673-4871-3

[65] A. Maconi, C. Monzio Compagnoni, A. S. Spinelli, A. L. Lacaita, "A new erase saturation issue in cylindrical junction-less charge-trap memory arrays", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 2.5.1–2.5.4 (2012). ISBN 978-1-4673-4871-3

[64] G. M. Paolucci, C. Miccoli, C. Monzio Compagnoni, L. Crespi, A. S. Spinelli and A. L. Lacaita, "investigation of cycling-induced V_T instabilities in NAND Flash cells via compact modeling", Proc. IMW, IEEE Inc., Piscataway, NJ, 194–197 (2012). ISBN 978-1-4673-1081-9

[63] C. Miccoli, C. Monzio Compagnoni, L. Chiavarone, S. Beltrami, A. L. Lacaita, A. S. Spinelli and A. Visconti, "Assessment of distributed-cycling schemes on 45-nm NOR Flash memory arrays", **best student paper award**, Proc. IRPS, IEEE Inc., Piscataway, NJ, 2A.1.1–2A.1.7 (2012). ISBN 978-1-4577-1680-5

[62] A. Mauri, N. Castellani, C. Monzio Compagnoni, A. Ghetti, P. Cappelletti, A. S. Spinelli and A. L. Lacaita, "Impact of atomistic doping and 3D electrostatics on the variability of RTN time constants in Flash memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 405–408 (2011). ISBN 978-1-4577-0505-2

[61] A. Maconi, A. Arreghini, C. Monzio Compagnoni, G. Van den Bosch, A. S. Spinelli, J. van Houdt and A. L. Lacaita, "Impact of lateral charge migration on the retention performance of planar and 3D SONOS devices", Proc. ESSDERC, IEEE Inc., Piscataway, NJ, 195–198 (2011). ISBN 978-1-4577-0708-7

[60] C. Miccoli, C. Monzio Compagnoni, A. S. Spinelli, and A. L. Lacaita, "Investigation of the programming accuracy of a double-verify ISPP algorithm for nanoscale NAND Flash memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 833-838 (2011). ISBN 978-1-4244-9111-7

[59] S. M. Amoroso, A. Maconi, A. Mauri, C. Monzio Compagnoni, E. Greco, E. Camozzi, S. Viganò, P. Tessariol, A. Ghetti, A. S. Spinelli and A. L. Lacaita, "3D Monte Carlo simulation of the programming dynamics and their statistical variability in nanoscale charge-trap memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 540–543 (2010). ISBN 978-1-4244-7419-6

[58] A. Maconi, C. Monzio Compagnoni, S. M. Amoroso, E. Mascellino, M. Ghidotti, G. Padovini, A. S. Spinelli, A. L. Lacaita, A. Mauri, G. Ghidini, N. Galbiati, A. Sebastiani, C. Scozzari, E. Greco, E. Camozzi, and P. Tessariol, "Investigation of the ISPP dynamics and of the programming efficiency of charge-trap memories", Proc. ESSDERC, IEEE Inc., Piscataway, NJ, 444–447 (2010). ISBN 978-1-4144-6661-0

[57] A. Bonfanti, M. Ceravolo, G. Zambra, R. Gusmeroli, T. Borghi, A. S. Spinelli and A. L. Lacaita, "A multi-channel low-power IC for neural spike recording with data compression and narrowband 400-MHz MC-FSK wireless transmission", Proc. ESSCIRC, IEEE Inc., Piscataway, NJ, 330-333 (2010). ISBN 978-1-4244-6664-1

[56] A. Bonfanti, M. Ceravolo, G. Zambra, R. Gusmeroli, A. S. Spinelli, A. L. Lacaita, G. N. Angotzi, G. Baranauskas and L. Fadiga, "A multi-channel low-power system-on-chip for single-unit recording and narrowband wireless transmission of neural signal", Proc. EMBC, IEEE Inc., Piscataway, NJ, 1555-1560 (2010). ISBN 978-1-4244-4124-2

[55] A. Spessot, A. Calderoni, P. Fantini, A. S. Spinelli, C. M. Compagnoni, F. Farina, A. L. Lacaita and A. Marmiroli, "Variability effects on the V_T distribution of nanoscale NAND Flash memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 970–974 (2010). ISBN 978-1-4244-5431-0

[54] S. M. Amoroso, A. Mauri, N. Galbiati, C. Scozzari, E. Mascellino, E. Camozzi, A. Rangoni, T. Ghilardi, A. Grossi, P. Tessariol, C. Monzio Compagnoni, A. Maconi, A. L. Lacaita, A. S. Spinelli and G. Ghidini, "Reliability constraints for TANOS memories due to alumina trapping and leakage", Proc. IRPS, IEEE Inc., Piscataway, NJ, 966–969 (2010). ISBN 978-1-4244-5431-0

[53] C. Monzio Compagnoni, C. Miccoli, R. Mottadelli, S. Beltrami, M. Ghidotti, A. L. Lacaita, A. S. Spinelli and A. Visconti, "Investigation of the threshold voltage instability after distributed cycling in nanoscale NAND Flash memory arrays", Proc. IRPS, IEEE Inc., Piscataway, NJ, 604–610 (2010). ISBN 978-1-4244-5431-0

[52] C. Monzio Compagnoni, L. Chiavarone, M. Calabrese, R. Gusmeroli, M. Ghidotti, A. L. Lacaita, A. S. Spinelli and A. Visconti, "Granular electron injection and random telegraph noise impact on the programming accuracy of NOR Flash memories" Proc. IRPS, IEEE Inc., Piscataway, NJ, 274–279 (2009). ISBN 978-1-4244-2889-2.

[51] A. Mauri, C. Monzio Compagnoni, S. Amoroso, A. Maconi, F. Cattaneo, A. Benvenuti, A. S. Spinelli and A. L. Lacaita, "A new physics-based model for TANOS memories program/erase", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 555–558 (2008). ISBN 1-4244-2377-4

[50] A. Ghetti, C. Monzio Compagnoni, F. Biancardi, A. L. Lacaita, S. Beltrami, L. Chiavarone, A. S. Spinelli, A. Visconti, "Scaling trends for random telegraph noise in deca-nanometer Flash memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 835-838 (2008). ISBN 1-4244-2377-4

[49] A. Bonfanti, T. Borghi, R. Gusmeroli, G. Zambra, A. Oliyink, L. Fadiga, A. S. Spinelli and G. Baranauskas, "A low-power integrated circuit for analog spike detection and sorting in neural prosthesis systems", **best student paper award**, Proc. Biodevices, IEEE Inc., NJ, 257–260 (2008). ISBN 1-4244-2879-3

[48] T. Borghi, A. Bonfanti, R. Gusmeroli, G. Zambra and A. S. Spinelli, "A power-efficient analog integrated circuit for amplification and detection of neural signals", Proc. EMBC, IEEE Inc., NJ, 4911–4915 (2008). ISBN 1-4244-1815-2

[47] A. Rabosio, K. Laganà, E. Menna, M. Matteoli, P. Kern, A. Spinelli, G. Baranauskas, "Large neuronal networks are needed for burst formation in cortical cultures in vitro", Proc. MEA Meeting, 80–81 (2008). ISBN 3-938345-05-5

[46] A. Ghetti, M. Bonanomi, C. Monzio Compagnoni, A. S. Spinelli, A. L. Lacaita and A. Visconti, "Physical modeling of single-trap RTS statistical distribution in Flash memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 610–615 (2008). ISBN 1-4244-2049-0

[45] C. Monzio Compagnoni, A. S. Spinelli, R. Gusmeroli, A. L. Lacaita, S. Beltrami, A. Ghetti and A. Visconti, "First evidence for injection statistics accuracy limitation in NAND Flash constant-current Fowler-Nordheim programming", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 165–168 (2007). ISBN 1-4244-0439-X

[44] A. S. Spinelli, C. Monzio Compagnoni, R. Gusmeroli, M. Ghidotti, A. L. Lacaita, "RTN effects in scaled Flash memory arrays", **invited paper**, Ext. Abs. SSDM, 896–897 (2007). ISBN 4-901070-38-X

[43] T. Borghi, A. Bonfanti, G. Zambra, R. Gusmeroli, A. L. Lacaita, A. S. Spinelli and G. Baranauskas, "An integrated low-noise multichannel system for neural signals amplification", Proc. ESSCIRC, IEEE Inc., Piscataway, NJ, D. Schmitt-Landsiedel, T. Noll, eds., 456–459 (2007). ISBN 1-4244-1125-4

[42] T. Borghi, A. Bonfanti, G. Zambra, R. Gusmeroli, A. S. Spinelli and G. Baranauskas, "A compact multichannel system for acquisition and processing of neural signals", Proc. EMBC, IEEE Inc., Piscataway, NJ, 441–444 (2007). ISBN 1-4244-0788-5

[41] C. Monzio Compagnoni, R. Gusmeroli, A. S. Spinelli, A. L. Lacaita, M. Bonanomi and A. Visconti, "Statistical investigation of random telegraph noise I_D instabilities in Flash cells at different initial trap-filling conditions", Proc. IRPS, IEEE Inc., Piscataway, NJ, 161–166 (2007). ISBN 1-4244-0918-7

[40] R. Gusmeroli, C. Monzio Compagnoni, A. Riva, A. S. Spinelli, A. L. Lacaita, M. Bonanomi and A. Visconti, "Defects spectroscopy in SiO_2 by statistical random telegraph noise analysis", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 483–486 (2006). ISBN 1-4244-0438-X

[39] R. Gusmeroli, A. Bonfanti, T. Borghi, A. S. Spinelli and G. Baranauskas, "A switched-capacitor neural preamplifier with an adjustable pass-band for fast recovery following stimulation", Proc. EMBC, IEEE Inc., Piscataway, NJ, 652–655 (2006). ISBN 1-4244-0033-3

[38] A. S. Spinelli and R. Gusmeroli, "Impact of source-drain tunneling on double-gate performance", Proc. EuroSimE, IEEE Inc., Piscataway, NJ, L. J. Ernst *et al.* eds., 456–459 (2006). ISBN 1-4244-0275-1

[37] R. Gusmeroli and A. S. Spinelli, "Performance improvement of ballistic double-gate devices and design trade-offs", Proc. EuroSimE, IEEE Inc., Piscataway, NJ, L. J. Ernst *et al.* eds., 452–455 (2006). ISBN 1-4244-0275-1

[36] R. Gusmeroli, A. S. Spinelli, C. Monzio Compagnoni, D. Ielmini, and A. L. Lacaita, "A Monte Carlo investigation of nanocrystal memory reliability", Proc. EuroSimE, IEEE Inc., Piscataway, NJ, L. J. Ernst *et al.* eds., 447–451 (2006). ISBN 1-4244-0275-1

[35] C. Monzio Compagnoni, A. S. Spinelli, A. Bianchini, A. L. Lacaita, S. Spiga and M. Fanciulli, "Transient currents in HFO_2 and their impact on circuit and memory applications", Proc. IRPS, IEEE Inc., Piscataway, NJ, 651–652 (2006). ISBN 0-7803-9498-4

[34] R. Gusmeroli, A. S. Spinelli, C. Monzio Compagnoni, D. Ielmini, F. Morelli and A. L. Lacaita, "Program and SILC constraints on NC memories scaling: a Monte Carlo approach", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 1061–1064 (2005). ISBN 0-7803-9268-X

[33] D. Ielmini, A. S. Spinelli, A. L. Lacaita, L. Chiavarone and A. Visconti, "A new charge-trapping technique to extract SILC-trap time constants in SiO_2", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 551–554 (2005). ISBN 0-7803-9268-X

[32] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita and R. Sotgiu, "Reliability assessment of discrete-trap memories for NOR applications", Proc. IRPS, IEEE Inc., Piscataway, NJ, 240–245 (2005). ISBN 0-7803-8803-8

[31] D. Ielmini, A. S. Spinelli, A. L. Lacaita, M. Robustelli, L. Chiavarone and A. Visconti, "High-energy oxide traps and anomalous soft-programming in Flash memories", *IEDM Tech. Dig.*, IEEE Inc., Piscataway, NJ, 493–496 (2004). ISBN 0-7803-8684-1

[30] M. Cioffi, C. Giordano, R. Gusmeroli, M. T. Raimondi and A. S. Spinelli, "Towards integrating the functions of cells with electrical processes", Proc. ETES-TESI 2004

[29] D. Ielmini, C. Monzio Compagnoni, A. S. Spinelli, A. L. Lacaita and C. Gerardi, "A new channel percolation model for V_T shift in discrete-trap memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 515–521 (2004). ISBN 0-7803-8315-X

[28] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita, C. Gerardi and S. Lombardo, "Statistical analysis of nanocrystal memory reliability", Proc. IRPS, IEEE Inc., Piscataway, NJ, 509–514 (2004). ISBN 0-7803-8315-X

[27] B. De Salvo, C. Gerardi, S. Lombardo, T. Baron, L. Perniola, D. Mariolle, P. Mur, A. Toffoli, M. Gely, M. N. Semeria, S. Deleonibus, G. Ammendola, V. Ancarani, M. Melanotte, R. Bez, L. Baldi, D. Corso, I. Crupi, R. A. Puglisi, G. Nicotra, E. Rimini, F. Mazen, G. Ghibaudo, G. Pananakakis, C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita, Y. M. Wan, K. vanderJeugd, "How far will silicon nanocrystals push the scaling limits of NVMs technologies?", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 597–600 (2003). ISBN 0-7803-7872-5

[26] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita, C. Gerardi, B. de Salvo, L. Perniola and S. Lombardo, "Program/erase dynamics and channel conduction in nanocrystal memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 549–552 (2003). ISBN 0-7803-7872-5

[25] R. Gusmeroli, A. S. Spinelli, A. Pirovano, A. L. Lacaita, F. Bœuf and T. Skotnicki, "2D QM simulation and optimization of decanano non-overlapped MOS devices", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 225–228 (2003). ISBN 0-7803-7872-5

[24] D. Ielmini, A. Ghetti, S. Beltrami, A. S. Spinelli, A. L. Lacaita and A. Visconti, "Experimental and Monte Carlo analysis of drain-avalanche hot-hole injection for reliability optimization in Flash memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 157–160 (2003). ISBN 0-7803-7872-5

[23] C. Monzio Compagnoni, D. Ielmini, A. S. Spinelli, A. L. Lacaita, C. Previtali and C. Gerardi, "Study of data retention for nanocrystal Flash memories", Proc. IRPS, IEEE Inc., Piscataway, NJ, 506–512 (2003). ISBN 0-7803-7649-8

[22] A. S. Spinelli, D. Ielmini, A. L. Lacaita, A. Sebastiani and G. Ghidini, "Analysis of quantum yield in n-channel MOSFETs", Proc. IRPS, IEEE Inc., Piscataway, NJ, 412–416 (2003). ISBN 0-7803-7649-8

[21] A. Chimenton, A. S. Spinelli, D. Ielmini, A. L. Lacaita, A. Visconti and P. Olivo, "Drain-accelerated degradation of tunnel oxides in Flash memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 167–170 (2002). ISBN 0-7803-7462-2

[20] D. Ielmini, A. S. Spinelli, A. L. Lacaita and M. J. van Duuren, "Correlated defect generation in thin oxides and its impact on Flash reliability", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 143–146 (2002). ISBN 0-7803-7462-2

[19] M. Bonesini, F. Ferri, P. Govoni, M. Paganoni, A. Parravicini, A. Tonazzo, A. Andreoni, M. Bondani, F. Paleari, A. S. Spinelli, D. Gibin, A. Guglielmi and A. Menegolli, "Construction of a fast laser-based calibration system for the Harp TOF counters wall", Nuclear Science Symposium Conference Record, IEEE Inc., Piscataway, NJ, 78–83 (2002). ISBN 0-7803-7636-6

[18] D. Ielmini, A. S. Spinelli, A. L. Lacaita, M. Gubello and M. Van Duuren, "Monitoring Flash EEPROM reliability by equivalent cell analysis", Proc. ESSDERC 2002, Univ. of Bologna, Bologna, G. Baccarani *et al.* eds., 359–362 (2002). ISBN 88-900847-8-2

[17] D. Ielmini, A. S. Spinelli, A. L. Lacaita, R. Leone and A. Modelli, "Localization of SILC in Flash memories after program/erase cycling", Proc. IRPS, IEEE Inc., Piscataway, NJ, 1–6 (2002). ISBN 0-7803-7352-9

[16] D. Ielmini, A. S. Spinelli, A. L. Lacaita and A. Modelli, "Statistical modeling of reliability and scaling projections for Flash memories", IEDM Tech. Dig., IEEE Inc., Piscataway, NJ, 703–706 (2001). ISBN 0-7803-7050-3

[15] A. Pirovano, A. L. Lacaita and A. S. Spinelli, "Fully 2D quantum-mechanical simulation of nanoscale MOSFET's" in *Simulation of semiconductor processes and devices 2001*, Springer-Verlag, D. Tsoukalas and C. Tsamis eds., 94–97 (2001). ISBN 3-211-83708-6

[14] D. Ielmini, A. S. Spinelli, A. L. Lacaita, L. Confalonieri and A. Visconti, "New technique for fast characterization of SILC distribution in Flash arrays", Proc. IRPS, IEEE Inc., Piscataway, NJ, 73–80 (2001). ISBN 0-7803-6587-9

[13] A. Modelli, F. Gilardoni, D. Ielmini and A. S. Spinelli, "A new conduction mechanism for the anomalous cells in thin oxide Flash EEPROMs", Proc. IRPS, IEEE Inc., Piscataway, NJ, 61–66 (2001). ISBN 0-7803-6587-9

[12] D. Ielmini, A. S. Spinelli, A. L. Lacaita, D. J. DiMaria and G. Ghidini, "Experimental and numerical analysis of the quantum yield", IEDM Technical Digest, IEEE Inc., Piscataway, NJ, 331–334 (2000). ISBN 0-7803-6438-4

[11] D. Ielmini, A. S. Spinelli, A. Lacaita and G. Ghidini, "Role of interface and bulk defect-states in the low-voltage leakage conduction of ultrathin oxides", Proc. ESSDERC 2000, Frontier Group, W. A. Lane *et al.* eds., 312–315 (2000). ISBN 2-86332-248-6

[10] A. S. Spinelli, A. Benvenuti, L. Conserva, A. L. Lacaita and A. Pacelli, "Quantum-mechanical 2D simulation of surface- and buried-channel p-MOS", Proc. SISPAD '2000, IEEE Inc., Piscataway, NJ, 192–195 (2000). ISBN 0-7803-6279-9

[9] D. Ielmini, A. S. Spinelli, A. L. Lacaita and G. Ghidini, "Evidence for recombination at oxide defects and new SILC model", Proc. IRPS, IEEE Inc., Piscataway, NJ, 55–64 (2000). ISBN 0-7803-5860-0

[8] A. S. Spinelli, A. Pacelli and A. L. Lacaita, "The impact of polysilicon quantization on ultra-thin oxide MOSFET characteristics", Proc. ULIS'2000 Workshop, LPCS-ENSERG, Grenoble, 89–92 (2000). ISBN 2-9514840-0-3

[7] D. Ielmini, A. S. Spinelli, A. L. Lacaita and G. Ghidini, "Impact ionization and stress-induced leakage current in thin gate oxides", Proc. ULIS'2000 Workshop, LPCS-ENSERG, Grenoble, 85–88 (2000). ISBN 2-9514840-0-3

[6] L. M. Perron, A. L Lacaita, A. S. Spinelli and C. Hamaguchi, "Characterization of the back-channel interface in SOI MOSFET's", Proc. ESSDERC '98, Editions Frontieres, Paris, A. Touboul *et al.* eds., 284–287 (1998). ISBN 2-86332-234-6

[5] A. S. Spinelli, A. L. Lacaita, M. Rigamonti and G. Ghidini, "Energy distribution of stress-induced oxide traps", Proc. ESSDERC '98, Editions Frontieres, Paris, A. Touboul *et al.* eds., 236–239 (1998). ISBN 2-86332-234-6

[4] A. Spinelli, A. Benvenuti and A. Pacelli, "Investigation of quantum effects in highly-doped MOSFET's by means of a self-consistent 2D model", IEDM Technical Digest, IEEE Inc, Piscataway, NJ, 399–402 (1996). ISBN 0-7803-3393-4

[3] A. Lacaita, S. Longhi, and A. Spinelli, "Limits to the timing performance of single photon avalanche diodes", Proc. International Conference on Applications of Photonic Technology – Plenum Press, New York, G. A. Lampropoulos *et al.* eds., 461–465 (1995). ISBN 0-306-45011-9

[2] A. Spinelli, L. Colombo, "Molecular Dynamics simulation of thin Ge films growth", Proc. 6^{th} International Joint EPS-APS Conference on Physics Computing, European Physical Society, Geneva, R. Gruber and M. Tomassini eds., 391–394 (1994).

[1] A. Lacaita, F. Zappa, S. Cova, G. Ripamonti, and A. Spinelli, "How to squeeze high quantum efficiency and high time resolution out of a SPAD", **invited paper**, Proc. 8^{th} International Workshop on Laser Ranging Instrumentation, – NASA Conference Publication 3214, J. J. Degnan ed., 5–10 (1993)

Book chapters

[3] C. Monzio Compagnoni, A. S. Spinelli, A. L. Lacaita, A. Ghetti, A. Visconti, "Emerging constraints on NAND Flash memory reliability", in *Nonvolatile memories: materials, devices and applications, Vol. 1*, American scientific publishers, T-Y. Tseng and S. M. Sze, eds., 267–293 (2012). ISBN 1-58883-250-3

[2] B. Majkusiac, P. Palestri, A. Schenk, A. S. Spinelli, C. Monzio Compagnoni and M. Luisier, "Modelling and simulation approaches for gate current computation", in *Nanoscale CMOS – innovative materials, modelling and characterization*, ISTE-Wiley, F. Balestra, ed., 213–257 (2010).

[1] C. Monzio Compagnoni, R. Gusmeroli, A. S. Spinelli, D. Ielmini, A. L. Lacaita and A. Visconti, "Present status and scaling challenges for the NOR Flash memory technology", in *Solid state electronics research advances*, Nova Science Publisher, S. B. Kobadze, ed., 101–134 (2009).

Tutorials

[4] A. S. Spinelli and C. Monzio Compagnoni, "Flash memory reliability", Tutorial presented at the IRPS 2011.

[3] A. S. Spinelli, C. Monzio Compagnoni and D. Ielmini, "Reliability issues of current and emerging NVMs", Tutorial presented at the ESREF 2010.

[2] A. S. Spinelli and C. Monzio Compagnoni, "Flash memory reliability 1: basic and emerging issues", Tutorial presented at the IRPS 2009.

[1] A. S. Spinelli and D. Ielmini, "A physical look at some reliability aspects of NOR Flash memories", Tutorial presented at the IRPS 2005.