3rd International Workshop on Thermal investigations of ICs and Microstructures

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THERMINIC

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3rd International Workshop on THERMAL INVESTIGATIONS of ICs and MICROSTRUCTURES

Workshop Programme

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Sunday 21st September		
14:00	**Registration**	
15:00	**Welcome address** **B. Courtois** General Chair, TIMA, Grenoble, France	
15:10	**Opening address** **H. Forster** European Commission, Brussels, Belgium	
15:20	**Invited talk** **D. Agonafer** IBM, Poughkeepsie, USA **Chair: H. Forster** European Commission, Brussels, Belgium	APPLICATION OF COMPUTATIONAL FLUID DYNAMICS TO COOLING OF COMPUTER SYSTEMS
16:00	**Coffee**	
16:20 **17:40**	**Session 1** **Chair: D. Blackburn** NIST, Gaithersburg, USA	**EVALUATION OF THERMAL MEASUREMENTS**

16:20	**V. Székely, M. Rencz, S. Torok, G. Farkas, Cs. Marta** Techn. Univ. of Budapest, Hungary	ADVANCES IN THE THERMAL TESTING
16:40	**V.A. Koval[1], S.Y. Yurish[2]** [1]State Univ. Lviv Polytechnica, The Ukraine [2]Institute of Computer Techn., The Ukraine	PRECISE FREQUENCY METHOD OF MEASUREMENT FOR INTEGRATED FREQUENCY-OUTPUT TEMPERATURE SENSORS
17:00	**M. Janicki, M. Zubert, A. Napieralski** Techn. Univ.of Lódz, Poland	APPLICATION OF INVERSE HEAT CONDUCTION PROBLEM SOLUTION WITH ERROR CORRECTION TO ESTIMATION OF IC TEMPERATURE
17:20	**Z. Suszynski** Techn. Univ. of Koszalin, Poland	PHOTOACOUSTIC EXAMINATION OF ADHESION IN LAYERED STRUCTURES
17:40	**Coffee**	
18:00 **19:20**	**Poster Session 1** **Chair: M. Rencz** Techn. Univ. of Budapest, Hungary	
	K.O. Petrosjanc, N.I. Rybov Moscow Univ. of Electr. and Mathematics, Russia	THERMAL RESISTANCE AND CAPACITANCES DETERMINATION FOR ELECTRO-THERMAL CIRCUIT SIMULATION WITH SPICE
	W. Wójciak, A. Napieralski, G. Jablonski, T. Poêniak Techn. Univ. of Lódz, Poland	THERMAL BENCHMARK INTEGRATED CIRCUIT IN BiCMOS TECHNOLOGY
	F. Shiwei, X. Xuesong, L. Changzhi Beijing Polytechnic Univ., PR China	THE NOVEL TEHCHNIQUE OF THERMAL MEASUREMENT FOR SEMICONDUCTOR DEVICE BY ELECTRICAL METHOD
	N.M. Ravindra[1], O.H. Gokce[1], F.M. Tong[1], S. Abedrabbo[1], V. Rajasekhar[1], A. Patel[1], G. Williamson[2], W. Maszara[2], A. Nanda[2], T. Speranza[2] [1]New Jersey Inst. of Techno., Newark, USA [2]SEMATECH, Austin, USA	TEMPERATURE AND WAVELENGTH DEPENDENT EMISSIVITY OF SIMOX

	Z. Suszynski Techn. Univ. of Koszalin, Poland	THE MEASUREMENT METHOD OF THE OPTICALLY NON-OPAQUE MATERIALS THERMAL PARAMETERS
	I. Stoian, P. Ungureanu, L. Cipcigan, C. Buduru IPA CLUJ, Cluj-Napoca, Romania	SYSTEM FOR TEMPERATURE MAPPING AND EVALUATION OF THE ENERGIZED HYBRID ICs AND IMICROPROCESSORS
	V. Székely, Cs. Marta, M. Rencz, G. Vegh, Zs. Benedek, S. Torok Techn. Univ. of Budapest, Hungary	THERMAL BENCHMARK CIRCUIT
	A.G. Madera Russia Academy of Science, Moscow, Russia	ANALYSIS AND COMPUTATION OF ACTUAL TEMPERATURE FIELDS IN ICs AND ELECTRON MODULES
	W. Pawelski, A. Napieralski, M. Grecki Techn. Univ. of Lódz, Poland	THE IGBT CIRCUIT-ORIENTED ISOTHERMIC MODEL
	M. Wiklund Lund Univ., Sweden	CALCULATION OF REAL POWER FLOW FROM A MOS TRANSISTOR MODEL
	Z. Lisik, J. Podgórski, M. Kaluza, M. Kopec Techn. Univ. of Lódz, Poland	3-D SIMULATOR OF HEAT TRANSFER IN SEMICONDUCTORS DEVICES
	V.A. Koval, D.V. Fedasyuk, I.Y. Kazymyra, M.B. Blyzniuk State Univ. Lviv Polytechnic, The Ukraine	PROVIDING OF ELECTRO-THERMAL COMPATIBILITY OF HYBRID MICROCIRCUITS IN CAD ENVIRONMENT
	J. Akhtar CEERI, Pilani, India	A QUANTITATIVE STUDY FOR OPTIMISATION OF DISCRETISING AND OVER-RELAXATION PARAMETERS IN THE FINITE-DIFFERENCE SOLUTION OF TRANSIENT HEAT FLOW EQUATION
	E. Lavitska State Univ. Lviv Polytechnic, The Ukraine	TEMPERATURE-DEPENDENT STRAIN OF SEMICONDUCTOR ELEMENTS AND ITS TECHNICAL APPLICATIONS
	J. Coughlan, S. Foley, A. Mathewson NMRC, Cork, Ireland	THE DISTRIBUTION OF STRESS IN TUNGSTEN-FILLED VIA STRUCTURES - INVESTIGATIONS USING FINITE ELEMENT ANALYSIS
	A. Druzhinin, E. Lavitska, I. Maryamova, Y. Pankov, V. Voronin State Univ. Lviv Polytechnic, The Ukraine	INFLUENCE OF THERMAL STRESSES ON TEMPERATURE-DEPENDENT CHARACTERISTICS OF SEMICONDUCTOR FILM RESISTORS

19:30	**Reception**

Monday 22nd September

08:40 **11:00**	**Session 2** **Chair: J. Parry** Flomerics Ltd, Surrey, United Kingdom	**THERMAL AND ELECTRO-THERMAL MODELLING AND SIMULATION**
8:40	**P.E. Raad[1], J.S. Wilson[2], D.C. Price[2]** [1]Southern Methodist Univ., Dallas, USA [2]Texas Instruments, Dallas, USA	ADAPTIVE MODELING OF THE TRANSIENTS OF SUBMICRON INTEGRATED CIRCUITS
9:00	**V.Székely** Techn. Univ. of Budapest, Hungary	SUNRED: A NEW THERMAL SIMULATOR AND TYPICAL APPLICATIONS
9:20	**F. Christiaens[1], B. Vandevelde[1], E. Beyne[1], J. Roggen[1], R. Mertens[1], J. Van Puymbroeck[2], M. Heerman[2], J. Berghmans[3]** [1]IMEC vzw, Leuven, Belgium [2]Siemens LPT, Oostkamp, Belgium [3]KU Leuven, Belgium	THERMAL MODELLING OF THE POLYMER STUD GRID ARRAY (PSGA^{TM}) STEADY-STATE ANALYSIS
9:40	**T. Veijola, L. Costa, M. Valtonen** Helsinki Univ. of Techn., Finland	AN IMPLEMENTATION OF ELECTROTHERMAL COMPONENT MODELS IN A GENERAL PURPOSE CIRCUIT SIMULATION PROGRAM
10:00	**S. Nooshabadi[1], G.S. Visweswran[2], D. Nagchoudhuri[2], K. Eshraghian[3]** [1]Northern Territory Univ., Australia [2]India Institute of Techn. - N.Delhi, India [3]Edith Cowan Univ., Australia	MODELLING OF THE MOS TRANSISTOR WITH SPATIALLY NON-UNIFORM TEMPERATURE PROFILE
10:20	**S. Rzepka[1], K. Banerjee[2], C. Hu[2]**	CHARACTERIZATION OF SELF-HEATING IN ADVANCED VLSI INTERCONNECT LINES BASED ON THERMAL FINITE ELEMENT SIMULATION

	[1]Techn. Univ. of Dresden, Germany [2] Univ. of California, Berkeley, USA	
10:40	**D. de Cogan** Univ. of East Anglia, United Kingdom	PROPAGATION ANALYSIS FOR THERMAL MODELLING
11:00	**Coffee**	
11:20 **12:20**	**Vendor presentations**	
12:30	**Lunch**	
14:00 **16:00**	**Free time**	
16:00 **17:20**	**Session 3** **Chair: A. Ortega** Univ. of Arizona, USA	**TEMPERATURE MAPPING**
16:00	B.C. Forget[1], S. Grauby[1], D. Fournier[1], P. Gleyzes[1], A.C. Boccara[1], A.M. Mansanares[2] [1]ESPCI, Paris, France [2]DEQ-IFGW-UNICAMP, Campinas, Brazil	50 kHz MODULATED PHOTOTHERMAL MICROSCOPIC RESOLUTION IMAGING USING A 256x256 PIXELS CAMERA COUPLED TO A MULTICHANNEL LOCK-IN DETECTION
16:20	**G. Breglio[1], S. Pica[2], S. Spirito[1], A. Tartaglia[1]** [1]Univ. of Napoli "Federico II", Italy [2]Ansaldo Trasporti, Napoli, Italy	EXPERIMENTAL DETECTION OF TIME DEPENDENT TEMPERATURE MAPS IN POWER BIPOLAR TRANSISTORS
16:40	**J.A. Batista[1], A.M. Mansanares[1], E.C. da Silva[1], M.B.C. Pimentel[2], N. Jannuzzi[2], D. Fournier[3]** [1]Univ. Estadual de Campinas, Brazil [2]Institut de Microeletrônica, Campinas, Brazil [3]UPMC, Paris, France	SUBSURFACE MICROSCOPY OF BIASED MOS-FET STRUCTURES: PHOTOTHERMAL AND ELECTROREFLECTANCE IMAGES

17:00	**O. Breitenstein, M. Langenkamp** Max-Planck Institut für Mikrostrukturphysik Halle, Germany	LOCK-IN CONTACT THERMOGRAPHY INVESTIGATION OF LATERAL ELECTRONIC INHOMOGENEITIES IN SEMICONDUCTOR DEVICES
17:20	**Coffee**	
18:00 **19:00**	**Poster Session 2** **Chair: M. Rencz** Techn. Univ. of Budapest, Hungary	
	P. Dupuy, K. Bellil, P. Tounsi, J.M. Dorkel LAAS, Toulouse, France	THERMAL AND ELECTROTHERMAL SIMULATION OF INTEGRATED POWER CIRCUITS USING SMODTHERM SOFTWARE
	V. Székely, M. Rencz, A. Poppe, A. Pahi, G. Hajas, L. Liptak-Fego Techn. Univ. of Budapest, Hungary	UNCOVERING THERMALLY INDUCED BEHAVIOR OF ANALOG AND DIGITAL CIRCUITS WITH THE SISSI SIMULATION PACKAGE
	M. Wiklund Lund Univ., Sweden	ELECTRO-THERMAL SIMULATION USING WAVEFORM RELAXATION
	W. Wójciak, M. Orlikowski, M. Zubert, A. Napieralski Techn. Univ. of Lódz, Poland	THE DESIGN AND ELECTRO-THERMAL MODELING OF MICRODEVICES IN CMOS COMPATIBLE MEMS TECHNOLOGY
	D. Allal, B. Bocquet IEMN, Lille, France	THERMOMETRIC MICRO-SENSOR BASED ON MICROWAVE CORRELATION RADIOMETRY
	K. Somogyi, G. Sáfrán Hungarian Academy of Sciences, Budapest, Hungary	FIRST ORDER PHASE TRANSITION FOR CRITICAL TEMPERATURE DETECTION
	C. S. Roumenin, A. Ivanov, P. Nikilova Bulgarian Academy of Sciences, Sofia, Bulgaria	A LINEAR MICROSENSOR FOR TEMPERATURE AND MAGNETIC FIELD USING FUNCTIONAL PRINCIPLE
	J. Verkelis[1], Z. Bliznikas[2], K. Breive[2], V.Dikinis[3], R. .armaitis[3] [1]Semiconductor Physics Institute, Vilnius, Lithuania [2]Institute of Materials Science and Applied Research of Vilnius University, Lithuania	VO_2THIN FILM FIXED TEMPERATURE HEAT SENSOR HAVING ACCIDENT MEMORY

	[3]Institute of Chemistry, Vilnius, Lithuania	
	M.J. Marongiu[1], A. Watwe[2], B. Kusha[2] [1]MJM Engineering Co., Naperville, USA [2]Fluent Inc., Evanston, USA	STUDIES ON THE ENHANCEMENT OF MICROCHANNEL HEAT SINKS WITH MICRO-HEAT PIPES AND OTHER HIGH THERMAL CONDUCTIVTY MATERIALS
	A.K. Stubos NCSR Demokritos, Attikis, Greece	THEORETICAL EVIDENCE AND CONCEPTUAL DESIGN FOR ENHANCED COOLING OF ELECTRONIC COMPONENTS VIA BOILING IN POROUS LAYERS
	K. Chung AI Technology, Inc., Princeton, USA	COMPARATIVE THERMAL MANAGEMENT WITH THERMAL GREASES, GASKETS, AND "PHASE-CHANGE PADS"
	P. Dziurdzia, P. Bratek, A. Kos Univ. of Mining and Metallurgy, Krakow, Poland	POWER FEEDBACK FOR TEMPERATURE CONTROL OF ICs
	K. Madani[1], G. deTremiolles[1&2] [1]Univ. Paris XII/LERISS, Lieusaint, France [2]IBM, Corbeil Essonnes, France	GLOBAL PERTURBATIONS EFFECTS ANALYSIS IN A CMOS ANALOGUE IMPLEMENTATION OF SYNCHRONOUS BOLTZMANN MACHINE
	A. Merticaru, N. Moldovan, M. Ilie Institute of Microtechnology, Bucharest, Romania	THE THERMAL MICROSHIELD OBTAINED BY ANISOTROPIC ETCHING OF SILICON WAFERS
	K. Somogyi Hungarian Academy of Sciences, Budapest, Hungary	SOME CRITICAL CONDITIONS OF THE THERMAL BREAKDOWN IN SEMICONDUCTORS
	F. P. Shih, T.Y. Wu, CH.H. Chen, T.L. Sung, C.Y. Tsai De Montfort Univ., Leicester, United Kingdom	EFFECTS OF NONEQUILIBRIUM LO PHONONS ON THE CARRIER HEATING IN SEMICONDUCTOR QUANTUM-WELL LASERS
	A. Belache[1], T. Gautier[1], J.C. de Jaeger[2], M. Lefebvre[2], G. Salmer[2] [1]Thomson-CSF, Elancourt, France [2]IEMN, Lille, France	ELECTRO-THERMAL INVESTIGATIONS OF GaAs MESFETs
19:00	**Banquet**	

20:30 **22:00**	**PANEL** **Moderator: T. Williams** IBM, Boulder, USA	**THERMAL MANAGEMENT: A LONELY FIGHT OR CONCURRENT ENGINEERING ?**
	Panelists: **D. Agonafer,** IBM, Poughkeepsie, USA **G. De Mey,** University of Ghent, Belgium **G. Kromann,** Motorola, Austin, USA **N. Sabry,** Anacad/Mentor Graphics, Meylan, France **T. Tarter,** AMD, Sunnyvale, USA	The panel intends to put together experts from various disciplines in connection with thermal issues like circuit design, testing, packaging, cooling, thermal management education, etc., in order to discuss to which extent the thermal issues in microelectronics may or may not be treated independently today and in the near future.

Tuesday 23rd September

09:00	**Invited talk** **A. Majumdar** Univ. of California, Berkeley, USA **Chair: V. Székely** Techn. Univ. of Budapest, Hungary	**HIGH-RESOLUTION THERMAL IMAGING OF ELECTRONIC DEVICES AND INTERCONNECTS**
09:40	**Coffee**	
10:00 **12:00**	**Session 4** **Chair: Y. Zorian** LogicVision, Princeton, USA	**SENSORS AND ACTUATORS**
10:00	**R.A. Bianchi, F.V. Santos, J.M. Karam, B. Courtois** TIMA, Grenoble, France	CMOS COMPATIBLE TEMPERATURE SENSOR USING LATERAL BIPOLAR TRANSISTOR FOR VERY WIDE TEMPERATURE RANGE APPLICATIONS
10:20	**U. Dillner, E. Kessler, V. Baier, R. Güttich, J.Müller** IPHT, Jena, Germany	THERMAL SIMULATION OF MICROMACHINED LINEAR THERMOPILE INFRARED RADIATION SENSOR ARRAYS
10:40	**T. Sokoll, V. Norkus, G. Gerlach** Techn. Univ. of Dresden, Germany	THERMAL AND SPATIAL RESOLUTION OF PYROELECTRIC LINEAR ARRAYS
11:00	**J.I. Hayasaka, M. Kimura** Tohoku-Gakuin Univ., Miyagi, Japan	PROPOSAL OF AN ULTRAMINIATURIZED THERMAL ANALYSER

11:20	**P.R. van der Meer, G.C.M. Meijer, M.J. Vellekoop, H.M.M. Kerkvliet** Delft Univ. of Techno., The Netherlands	A LOW-COST TEMPERATURE-CONTROL SYSTEM FOR SURFACE ACOUSTIC WAVE GAS SENSORS USING SMART TEMPERATURE SENSORS
11:40	**G. Cocorullo[1&2], F.G. Della Corte[1], I. Rendina[1]** [1]CNR IRECE, Napoli, Italy [2]Univ. della Calabria, Rende, Italy	ALL-SILICON THERMO-OPTIC MICRO-SWITCHES REALIZED BY VLSI TECHNOLOGY
12:15	**Lunch**	
14:00 **15:40**	**Session 5** **Chair: W. Claeys** Univ. Bordeaux I, Talence, France	**MEASURING THERMAL MATERIAL PARAMETERS**
14:00	**S. Dilhaire, T. Phan, E. Schaub, W. Claeys** Univ. Bordeaux I, Talence, France	THERMOMECHANICAL STUDIES OF MICROELECTRONIC INTERCONNECTS BY DIFFERENTIAL INTERFEROMETRY
14:20	**B. Bonello, B. Perrin, C. Rossignol** Univ. P. & M. Curie, Paris, France	THERMAL PROPERTIES OF SUB-MICROMETER NANOSTRUCTURES IN THE PICOSECOND REGIME
14:40	**M. Malinski, L. Bychto** Techn. Univ. of Koszalin, Poland	PHOTOACOUSTIC METHODS OF DETERMINATIONS OF THERMAL PARAMETERS OF ELECTRONIC MATERIALS
15:00	**K. Kurabayashi, K.E. Goodson** Stanford Univ., USA	MEASUREMENT OF THE ANISOTROPIC THERMAL CONDUCTIVITY IN POLYMER THIN FILMS FOR LOW-DIELECTRIC-CONSTANT PASSIVATION
15:20	**V.V. Luchinin, A.V. Korlyakov** St. Petersburg Electr. Univ., Russia	THE SILICON CARBIDE-ON-INSULATOR STRUCTURE AS A SUBJECT OF THERMAL INVESTIGATIONS
15:40 **16:20**	**Special Session: DELPHI/SEED** **Chair: V. Székely** Techn. Univ. of Budapest, Hungary	This special session is dedicated to Harvey Rosten, coordinator of the DELPHI project, who died in June this year. He will be remembered for his many contributions to the industry, and particularly his work on the compact modelling of packages
	J. Parry, H. Rosten Flomerics Ltd, Surrey, United Kingdom	AN UPDATE ON THE INDUSTRIAL EVALUATION OF THE DELPHI RESULTS AND THE PERFORMANCE OF DELPHI COMPACT MODELS
16:20 **16:30**	**Closing remarks**	

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