



COLLECTION OF PAPERS PRESENTED AT THE

12th International Workshop on THERMal INvestigation of ICs and Systems

**Nice, Côte d'Azur, France
27-29 September 2006**



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12th International Workshop on
THERMAL INVESTIGATIONS of ICs and SYSTEMS
27-29 September 2006, Nice,
Côte d'Azur, France.

PROGRAM SCHEDULE

WEDNESDAY 27 SEPTEMBER 2006	
08:00–09:30	Registration & Welcome Coffee
09:30–09:40	Welcome Address Chair: Bernard Courtois, <i>TIMA Labs, Grenoble, France</i>
09:40–10:20	Invited Talk I: ENABLING ELECTRONIC PROGNOSTICS USING THERMAL DATA Michael Pecht, <i>CALCE Electronic Products and Systems Center, U. of Maryland, College Park, USA</i> Chair: Clemens Lasance, <i>Philips Research Laboratories, Eindhoven, The Netherlands</i>
10:20–11:40	Session 1: TEMPERATURE MEASUREMENTS Chair: Gilbert De Mey, <i>Ghent U., Belgium</i>
	10:20 [1007] - THERMAL PROPERTIES OF HIGH POWER LASER BARS INVESTIGATED BY THERMOREFLECTANCE AND MICRO-RAMAN SPECTROSCOPY Dorota Pierscinska, Kamil Pierscinski, Tomasz Ochalski, Maciej Bugajski, <i>Institute of Electron Technology, Poland</i> Jens W. Tomm, <i>Max Born Institute, Germany</i>
	10:40 [1055] - CCD THERMOREFLECTANCE THERMOGRAPHY SYSTEM: METHODOLOGY AND EXPERIMENTAL VALIDATION Pavel Komarov, Mihai Burzo, Peter Raad, <i>Southern Methodist U., Dallas, USA</i>
	11:00 [1021] - -55°C TO 170°C HIGH LINEAR VOLTAGE REFERENCES CIRCUITRY IN 0.18µm CMOS TECHNOLOGY Joseph Tzuo-sheng Tsai, Herming Chiueh, <i>National Chiao Tung U., Taiwan</i>
	11:20 [1046] - TEMPERATURE MEASUREMENT IN THE INTEL® CORETM DUO PROCESSOR Efraim Rotem, Aviad Cohen, Harel Cain, <i>Intel, Haifa, Israel</i>
11:40	 COFFEE BREAK
12:00–13:00	POSTER INTRODUCTION SESSION Chair: Márta Rencz, <i>Budapest U. of Technology and Economics, Hungary</i> The posters will be introduced by one slide in maximum 3 minutes each.
	12:00 [1001] - REDUCING THE POSSIBILITY OF SUBJECTIVE ERROR IN THE DETERMINATION OF THE STRUCTURE-FUNCTION-BASED EFFECTIVE THERMAL CONDUCTIVITY OF PCBs Erno Kollar, <i>BUTE, Hungary</i>
	12:03 [1015] - THE APPLICATION OF ARTIFICIAL NEURAL NETWORK FOR THE ASSESSMENT OF THERMAL PROPERTIES OF MULTI-LAYER SEMICONDUCTOR STRUCTURE Zbigniew Suszynski, Mateusz Kosikowski, Radoslaw Duer, <i>U. of Technology Koszalin, Poland</i>
	12:06 [1028] - A TEMPERATURE ANALYSIS OF HIGH-POWER ALGAN/GAN HEMTS Jo Das, Herman Oprins, Wouter Ruythooren, Joff Derluy, Marianne Germain, Gustaaf Borghs, <i>IMEC, Leuven, Belgium</i> Hangfeng Ji, Andrei Sarua, Martin Kuball, <i>U. of Bristol, UK</i>
	12:09 [1027] - FLOW VISUALIZATION OF THE BUOYANCY-INDUCED CONVECTIVE HEAT TRANSFER IN ELECTRONICS COOLING Carmine Sapia, <i>U. "Roma TRE", Italy</i>
	12:12 [1049] - CONTACTLESS THERMAL CHARACTERIZATION METHOD OF PCB-S USING DIFFERENT IR SENSOR ARRAYS György Bognár, Vladimír Székely, Márta Rencz, <i>BUTE, Hungary</i>
	12:15 [1013] - THE METHOD OF NON-LINEAR DISTORTIONS ELIMINATION IN PHOTOACOUSTIC INVESTIGATION OF LAYERED SEMICONDUCTOR STRUCTURE Zbigniew Suszynski, Radoslaw Duer, Mateusz Kosikowski, <i>U. of Technology, Koszalin, Poland</i>
	12:18 [1042] - REPRESENTATIONS OF MULTI-PORT PASSIVE DYNAMIC THERMAL NETWORKS Lorenzo Codecasa, Dario D'Amore, Paolo Maffezzoni, <i>Politecnico di Milano, Italy</i>
	12:21 [1047] - THERMAL MODELING OF HIGH POWER LED MODULES Dany Benoy, Philips Lighting, <i>Eindhoven, The Netherlands</i>
	12:24 [1050] - CREATING TEMPERATURE DEPENDENT NI-MH BATTERY MODELS FOR LOW POWER MOBILE DEVICES Domokos D. Szente-Varga, Gyula Horvath, Márta Rencz, <i>BUTE, Hungary</i>
	12:27 [1017] - ELECTRONICS COOLING FAN NOISE PREDICTION Antoine Dozolme, Thierry Marchal, <i>Fluent Inc, Wavre, Belgium</i> Hossam Metwally, <i>Fluent Inc, Evanston, USA</i>
	12:30 [1019] - LIQUID COOLING OF BRIGHT LEDS FOR AUTOMOTIVE APPLICATIONS Yan Lai, Nicolás Cordero, <i>Tyndall National Institute, Cork, Ireland</i>

	12:33 [1022] - THERMAL DESIGN OF POWER SEMICONDUCTOR MODULES FOR MOBILE COMMUNICATION SYSTEMS Yasuo Osone, <i>Hitachi, Ltd., Ibaraki, Japan</i>
	12:36 [1025] - FAILURE ANALYSIS AND FIELD FAILURES: A REAL SHORTCUT TO RELIABILITY IMPROVEMENT Mura Giovanna, <i>DIEE/U. of Cagliari, Italy</i>
	12:39 [1040] - A MORE FLEXIBLE REALIZATION OF THE SUNRED ALGORITHM László Pohl, Vladimir Székely, <i>BUTE, Hungary</i>
	12:42 [1018] - RELIABILITY EVALUATION METHOD FOR ELECTRONIC DEVICE BGA PACKAGE CONSIDERING THE INTERACTION BETWEEN DESIGN FACTORS Satoshi Kondo, Qiang Yu, Tadahiro Shibutani, Masaki Shiratori, <i>Yokohama National U., Japan</i>
	12:45 [1032] - MODELING WITH STRUCTURE OF RESINS IN ELECTONIC COMPORNENTS Tsubasa Matsumoto, Msaki Shiratori, Kyouo U, Tadahiro Shibutani, Hikaru Hirota, <i>Yokohama National U., Japan</i>
13:00	 LUNCH
14:30-16:50	Session 2: THERMAL SIMULATION Chair: Lorenzo Codecasa, <i>Politecnico di Milano, Italy</i>
	14:30 [1004] - ELECTRONICS WARMING AND OPTIMIZATION STUDY SUBJECT TO LOW TEMPERATURE ENVIRONMENTS Kevin Khalkhali, Marinela Gombosov, <i>Parker Aerospace, Irvine, USA</i>
	14:50 [1014] - MODEL REDUCTION FOR POWER ELECTRONICS SYSTEMS WITH MULTIPLE HEAT SOURCES Adam Augustin, Torsten Hauck, <i>Freescale Semiconductor, Munich, Germany</i> Bartosz Maj, Julia Czernohorsky, <i>Continental Teves AG, Frankfurt, Germany</i> Evgenii Rudnyi, Jan Korvink, <i>IMTEK/U. of Freiburg, Germany</i>
	15:10 [1026] - DYNAMIC COMPACT THERMAL MODEL WITH NEURAL NETWORKS FOR RADAR APPLICATIONS Grégory Mallet, Philippe Leray, <i>LITIS, Rouen, France</i> Hubert Polaert, Clément Tolant, Philippe Eudeline, <i>THALES AIR DEFENCE, Ymare, France</i>
	15:30 [1038] - THERMAL TRANSIENT MULTISOURCE SIMULATION USING CUBIC SPLINE INTERPOLATION OF THERMAL IMPEDANCES Dirk Schweitzer, <i>Infineon Technologies AG, Munich, Germany</i>
	15:50 [1039] - DYNAMIC THERMAL ANALYSIS OF A POWER AMPLIFIER Jedrzej Banaszczyk, Marcin Janicki, Andrzej Napieralski, <i>Tech. U. of Lodz, Poland</i> Gilbert De Mey, Bjorn Vermeersch, Piotr Kawka, <i>Ghent U., Belgium</i>
	16:10 [1058] - ULTRAFAST TEMPERATURE PROFILE CALCULATION IN IC CHIPS Ali Shakouri, <i>U. of California, USA</i>
	16:30 [1056] - A COUPLED THERMOREFLECTANCE THERMOGRAPHY EXPERIMENTAL SYSTEM AND ULTRA-FAST ADAPTIVE COMPUTATIONAL ENGINE FOR THE COMPLETE THERMAL CHARACTERIZATION OF THREE-DIMENSIONAL ELECTRONIC DEVICES: VALIDATION Peter Raad, Pavel Komarov, Mihai Burzo, <i>Southern Methodist U., Dallas, USA</i>
16:50	 COFFEE BREAK
17:10-18:10	VENDORS SESSION Chair: Bernard Courtois, <i>TIMA Labs, Grenoble, France</i>
18:10	EXHIBITION & POSTER VIEWING
18:30	 COCKTAIL
THURSDAY 28 SEPTEMBER 2006	
08:45	 COFFEE
09:00-09:40	Invited Talk II: MICROFLUIDIC TECHNOLOGIES FOR INTEGRATED THERMAL MANAGEMENT Ari Glezer, <i>Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, USA</i> Chair: Vladimir Székely, <i>BUTE, Budapest, Hungary</i>
09:40-10:40	Session 3: MEASUREMENT OF THERMAL PROPERTIES Chair: Wilfrid Claeyss, <i>U. of Bordeaux, France</i>
	09:40 [1002] - CHARACTERISATION OF THERMAL INTERFACE MATERIALS FOR THERMAL SIMULATION Ralph Schacht, Daniel May, Astrid Gollhardt, Olaf Wittler, Bernhard Wunderle, Bernd Michel, <i>Fraunhofer IZM, Berlin, Germany</i> Herbert Reichl, <i>Technical U. Berlin, Germany</i>
	10:00 [1003] - MEASUREMENTS OF THERMOPHYSICAL PROPERTY OF THIN FILMS BY LIGHT PULSE HEATING THERMOREFLECTANCE METHODS Baba Tetsuya, Ishikawa Kazuko, Yagi Takashi, Taketoshi Naoyuki, <i>National Metrology Institute of Japan/AIST, Ibaraki, Japan</i>
	10:20 [1031] - THERMAL TRANSIENT CHARACTERIZATION OF PACKAGED THIN FILM MICROCOOLERS Kazuhiko Fukutani, Rajeev Singh, Ali Shakouri, <i>U. of California, Santa Cruz, USA</i>
10:40	 COFFEE BREAK
11:10-11:50	Session 4: RELIABILITY Chair: Zoran Radivojevic, <i>Nokia Research Center, Helsinki, Finland</i>
	11:10 [1005] - OPTIMIZED CURING PROCESS AND STRESS ANALYSIS OF INK-JET BASED PRINTED ELECTRONICS Zoran Radivojevic, Klas Andersson, Markku Heino, <i>Nokia Research Center, Helsinki, Finland</i>

	Hahizume Kenichi, Kaoru Tanaka, Akiko Kamigori, <i>Nokia Research Center, Tokyo, Japan</i> Paullina Mansikkamaki, Matti Mantysalo, <i>Tampere U. of Technology, Finland</i>
	11:30 [1048] - THERMAL STRESS FAILURES: A NEW EXPERIMENTAL APPROACH FOR PREDICTION AND PREVENTION Michael Hertl, <i>INSIDIX, Seyssins, France</i>
12:00	 LUNCH
13:30-15:00	EXHIBITION & POSTER VIEWING
	Social event: visit of The Villa Ephrussi de Rothschild 15:30 Buses departure in front of the Hotel Visit of The Villa Ephrussi de Rothschild 18:00 Cocktail 18:30 Buses departure to Nice Free time in Nice
FRIDAY 29 SEPTEMBER 2006	
08:30-10:30	Session 5: THERMAL MODELING AND INVESTIGATION OF PACKAGES Chair: John Janssen, <i>Philips Semiconductors, The Netherlands</i>
	08:30 [1006] - LOCALIZED LNA COOLING IN VACUUM Frans Schreuder, Jan Geralt Bij de Vaate, <i>ASTRON, Dwingeloo, The Netherlands</i>
	08:50 [1041] - NOVEL PROJECTION-BASED APPROACH TO EXTRACT COMPACTS MODELS OF NONLINEAR THERMAL NETWORKS Lorenzo Codecasa, Dario D'Amore, Paolo Maffezzoni, <i>Politecnico di Milano, Italy</i>
	09:10 [1044] - DESIGN ISSUES OF A VARIABLE THERMAL RESISTANCE Vladimir Székely, Gabor Mezosi, <i>BUTE, Hungary</i>
	09:30 [1052] - THERMAL MEASUREMENT AND MODELING OF MULTI-DIE PACKAGES Yan Zhang, John Wilson, <i>Flomerics Inc., USA</i> Gabor Farkas, Peter Szabo, <i>MicReD, Budapest, Hungary</i> Andras Poppe, <i>MicReD/BUTE, Hungary</i> John Parry, <i>Flomerics Ltd., UK</i>
	09:50 [1053] - ELECTRICAL, THERMAL AND OPTICAL CHARACTERIZATION OF POWER LED ASSEMBLIES Andras Poppe, <i>MicReD/BUTE, Hungary</i> Shatil Haque, <i>Philips-Lumileds</i> Gabor Farkas, <i>MicReD, Hungary</i> Gyorgy Horvath, <i>BUTE, Hungary</i>
	10:10 [1054] - THERMAL BENCHMARK SOFTWARE Marius Marcu, <i>Politehnica U. of Timisoara, Romania</i>
10:30	 COFFEE BREAK
11:00-13:00	Special session: ADVANCED TEMPERATURE MEASUREMENTS AT SUB-MICRON SCALES Chairs: Sebastian Volz, <i>Ecole Centrale Paris, Châtenay-Malabry, France</i> Peter Raad, <i>Southern Methodist U., Dallas, USA</i>
	11:00 INTRODUCTION Sebastian Volz, <i>Ecole Centrale Paris, Châtenay-Malabry, France</i> Peter Raad, <i>Southern Methodist U., Dallas, USA</i> Temperature levels and gradients are governing the reliability and life time of ICs. Due to size reduction, new metrologies are required to probe temperature at nanoscales (10-500nm). The session features the advancements in the main fields of Scanning Thermal Microscopy and Photothermal techniques.
	11:10 PICOSECOND THERMAL IMAGING Stefan Dilhaire, <i>U. Bordeaux 1, Talence, France</i>
	11:30 RECENT ADVANCEMENTS IN PHOTOTHERMAL MEASUREMENTS Gilles Tessier, <i>ESPCI, Paris, France</i>
	11:50 LEVERAGING MEASUREMENTS, MODELS, AND NUMERICS Peter Raad, <i>Southern Methodist U., Dallas, USA</i>
	12:10 [1020] - QUANTITATIVE ANALYSIS OF 3W-SCANNING THERMAL MICROSCOPY IN VACUUM Pierre-Olivier Chapuis, Sebastian Volz, <i>Ecole Centrale Paris, Châtenay-Malabry, France</i>
	12:30 THERMAL CHARACTERIZATION OF MICROREFRIGERATORS ON A CHIP Ali Shakouri, <i>U. of California Santa Cruz, Santa Cruz, USA</i>
13:00	 LUNCH
14:00-16:20	Session 6: ELECTROTHERMAL SIMULATION AND MODELINGS Chair: Andrzej Napieralski, <i>Tech. U. of Lodz, Poland</i>
	14:00 [1008] - THE HOT-SPOT PHENOMENON AND ITS COUNTERMEASURES IN BIPOLAR POWER TRANSISTORS BY ANALYTICAL ELECTRO-THERMAL SIMULATION Fabio Stefani, Paolo Emilio Bagnoli, <i>U. of Pisa, Italy</i>
	14:20 [1010] - LUMPED ELECTRO-THERMAL MODEL OF ON-CHIP INTERCONNECTS Nadia Spennagallo, Lorenzo Codecasa, Dario D'Amore, Paolo Maffezzoni, <i>Politecnico di Milano, Italy</i>

	14:40 [1011] - ADVANCED COMPACT THERMAL MODELING BY USING VHDL-AMS Wasim Habra, Patrick Tounsi, Jean-Marie Dorkel, <i>LAAS-CNRS, Toulouse, France</i>
	15:00 [1029] - THERMAL AND SENSITIVITY ANALYSIS OF MULTI-FIN DEVICES Brian Swahn, <i>Tufts U., USA</i>
	15:20 [1033] - HEATRING - SMART INVESTIGATION OF TEMPERATURE IMPACT ON INTEGRATED CIRCUIT DEVICES Alexandre Nentchev, <i>Wien U. of Technology, Austria</i>
	15:40 [1045] - AN EXTENDABLE MULTI-PURPOSE SIMULATION AND OPTIMIZATION FRAMEWORK FOR THERMAL PROBLEMS IN TCAD APPLICATIONS Stefan Holzer, <i>Wien U. of Technology, Austria</i>
	16:00 [1024] - THERMOS3, A TOOL FOR 3D ELECTROTHERMAL SIMULATION OF SMART POWER MOSFETS Giovanni Buonaiuto, Andrea Irace, Giovanni Breglio, Paolo Spirito, <i>U. of Naples Federico II, Italy</i>
16:20-16:30	Closing Remarks Chair: Bernard Courtois, <i>TIMA Labs, Grenoble, France</i>

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