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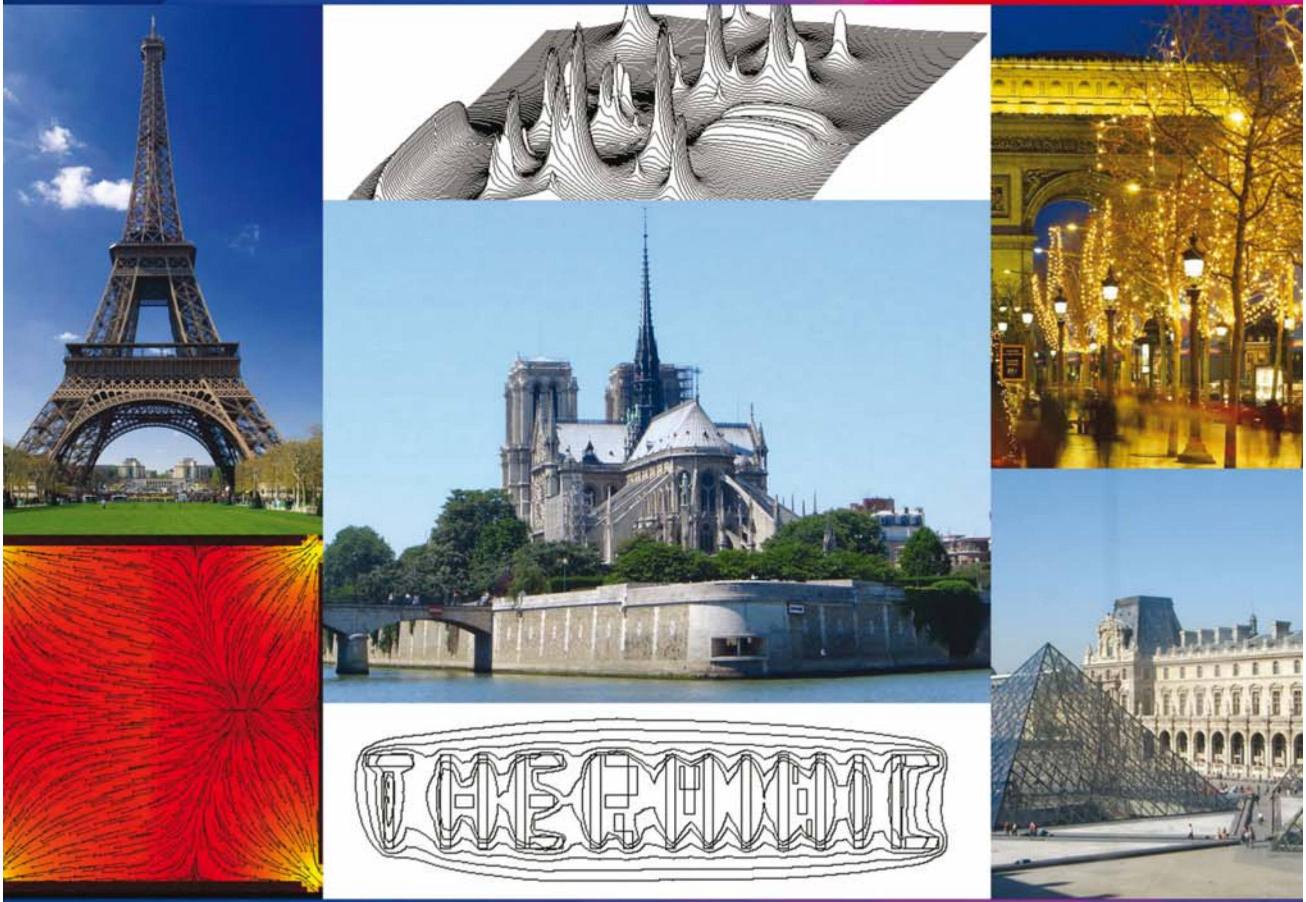

17th International Workshop on Thermal investigations of ICs and Systems

Paris, France, 27-29 September 2011

General Chair
Bernard Courtois, CMP Grenoble, France

Vice General Chair
Marta Rencz, BUTE, Budapest, Hungary

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TUESDAY 27 SEPTEMBER 2011

08:00-10:00 **REGISTRATION**

10:00-10:10 **WELCOME ADDRESS**

Bernard Courtois, *CMP, Grenoble, France*

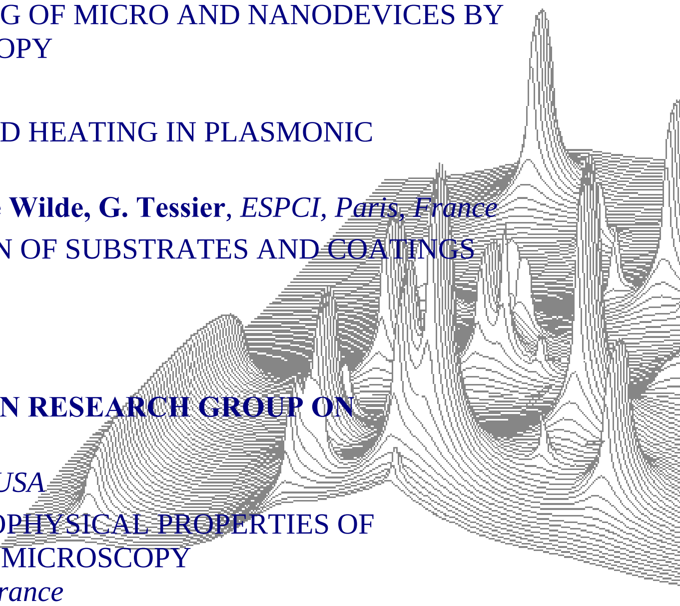
10:10-10:50 **INVITED TALK I: SYSTEM-LEVEL THERMAL-AWARE DESIGN OF 3D MULTI-PROCESSORS WITH INTER-TIER LIQUID COOLING**

David Atienza Alonso, *Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland*

Chair: **Márta Rencz**, *Budapest Univ. of Technology and Economics, Hungary*

10 :50-11:50 **SPECIAL SESSION ON THE EUROPEAN RESEARCH GROUP ON NANOSCALE/THERMAL I**

Chair: **Peter Raad**, *South. Methodist Univ., USA*



10:50 HIGH RESOLUTION THERMAL IMAGING OF MICRO AND NANODEVICES BY SCANNING FLUORESCENCE MICROSCOPY

Lionel Aigouy, *ESPCI, Paris, France*

11:10 HETERODYNE IMAGING OF LOCALIZED HEATING IN PLASMONIC NANOANTENNAS

Sarah Y. Suck, S. Collin, N. Bardou, Y. De Wilde, G. Tessier, *ESPCI, Paris, France*

11:30 PHOTOTHERMAL CHARACTERIZATION OF SUBSTRATES AND COATINGS

Christ Glorieux, *KU Leuven, Belgium*

11 :50-12 :20 Coffee break

12:20-13:20 **SPECIAL SESSION ON THE EUROPEAN RESEARCH GROUP ON NANOSCALE/THERMAL II**

Chair: **Peter Raad**, *South. Methodist Univ., USA*

12:20 CHARACTERIZATION OF THE THERMOPHYSICAL PROPERTIES OF MATERIALS BY SCANNING THERMAL MICROSCOPY

Séverine Gomès, *CETHIL, INSA de Lyon, France*

12:40 NEW METHODS DEVELOPED FOR TESTING NANOCOMPOSITE THERMAL INTERFACE MATERIALS

Márta Rencz, *Budapest Univ. of Technology and Economics, Hungary*

13:00 [18] THERMAL INTERFACE MATERIALS BASED ON CARBON NANOTUBE CARPET AND POLYMERS

Sebastian Volz, Yuxiang Ni, *Ecole Centrale Paris, France*

13:30-15:00 Lunch

15:00-16:40 **THERMINATOR SPECIAL SESSION I**

Chair: **Vadim Tsoi**, *Huawei Technologies, Sweden*

15:00 THE THERMINATOR PROJECT: MIDWAY ACHIEVEMENTS AND PERSPECTIVES

Márta Rencz, *Budapest Univ. of Technology and Economics, Hungary*, **Salvatore Rinaudo, Enrico Macii**, *Politecnico di Torino, Italy*, **Salvatore Rinaudo, Giuliana Gangemi**, *STMicroelectronics, Italy*

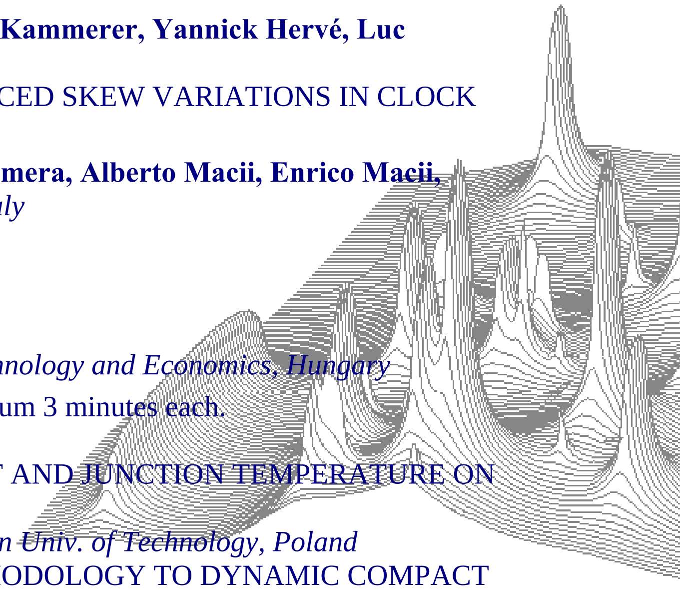
15:20 [44] AN ANALOG BEHAVIORAL THERMAL MACRO-MODEL AIMED AT REPRESENTING AN ELEMENTARY PORTION OF A DISCRETE IGBT POWER DEVICE

Gaetano Bazzano, Daniela Grazia Cavallaro, Giuseppe Greco, *STMicroelectronics, Italy*

15:40 [59] SELF-HEATING EFFECTS IN NANO-SCALED MOSFETS AND THERMAL

AWARE COMPACT MODELS
Alex Burenkov, Jurgen Lorenz, *FhG Institute for Integrated Systems & Device Technology, Germany*

16:00 [7] 3D ELECTRO-THERMAL SIMULATIONS OF ANALOG ICS CARRIED OUT WITH STANDARD CAD TOOLS AND VERILOG-A
Jean-Christophe Krencker, Jean-Baptiste Kammerer, Yannick Hervé, Luc Hébrard, *InESS Strasbourg, France*



16:20 [57] MODELING OF THERMALLY INDUCED SKEW VARIATIONS IN CLOCK DISTRIBUTION NETWORK
Alessandro Sassone, Wei Liu, Andrea Calimera, Alberto Macii, Enrico Macii, Massimo Poncino, *Politecnico di Torino, Italy*

16:40-17:10 Coffee break

17:10-17:40 **POSTER INTRODUCTION SESSION I**
Chair: **Márta Rencz**, *Budapest Univ. of Technology and Economics, Hungary*

Posters are introduced by one slide in maximum 3 minutes each.

17:10 [11] THE INFLUENCE OF THE AMBIENT AND JUNCTION TEMPERATURE ON THE MPS CRITICAL PARAMETERS
Aneta Hapka, Wlodzimierz Janke, *Koszalin Univ. of Technology, Poland*

17:13 [12] EXTENSION OF THE DELPHI METHODOLOGY TO DYNAMIC COMPACT THERMAL MODEL OF ELECTRONIC COMPONENT
Eric Monier-Vinard, Cheikh Tidiane Dia, Valentin Bissuel, Olivier Daniel, Julien Dufrenne, *Thales Corporate Services, France,* **Cheikh Tidiane Dia, Najib Laraqi**, *LTIE Avray, France*

17:16 [15] HEAT TRANSFER ENHANCEMENT IN IR TRANSPARENT MATERIALS
Dmitri Chestakov, J.H. Yu, *Philips Eindhoven, The Netherland*

17:19 [20] MEASUREMENT OF THE TIME-CONSTANT SPECTRUM: SYSTEMATIC ERRORS, CORRECTION
Vladimír Székely, *Mentor Graphics, Hungary*, **Albin Szalai**, *Budapest Univ. of Technology & Economics, Hungary*

17:22 [21] THERMAL ANALYSIS OF THE TYPE OF METAL DESIGN FOR LIGHT EMITTING DIODE
So Hyeon Mun, Jong Hwa Choi, *Myongji Univ., Korea,* **Moo Whan Shin**, *Yonsei Univ., Korea*

17:25 [22] LOCAL CONTROL OF SI/GE INTERFACE THERMAL RESISTANCE
Yann Chalopin, Sebastian Volz, *Ecole Centrale Paris, France,* **Gang Chen**, *MIT*

17:28 [24] CFD TRANSIENT MODEL OF THE NATURAL CONVECTION HEAT TRANSFER FOR AN HEAT SINK EFFECTS OF INCREASING SURFACE AND FINS SPACING
Carmine Sapia, Giorgio Sozio, *Univ. "Roma TRE", Italy*

17:31 [26] INVESTIGATION OF THE LOCAL SEEBECK COEFFICIENT OF METALLIC MATERIALS BY A SthM BASED TECHNIQUE
Mathieu Bardoux, *Univ. de Lyon, France,* **Xavier Kleber, Patrice Chantrenne, Séverine Gomès**, *INSA de Lyon, France*

17:34 [27] ADVANCED THERMAL GROUND PLANE FOR MICROELECTRONICS
Jia Cai Oh, Nanyang, KingHo Li, SoonEng Ong, Kokfah Choo, *Technological Univ., Singapore*

17:37 [31] CONTRACTING CURRENT PATHS IN VANADIUM DIOXIDE THIN FILMS
Márton Bein, János Mizsei, *Budapest Univ. of Technology & Economics, Hungary*

17:40-18:10 Coffee break

18:10-18:40 **POSTER INTRODUCTION SESSION II**

Chair: **Márta Rencz**, *Budapest Univ. of Technology & Economics, Hungary*

Posters are introduced by one slide in maximum 3 minutes each.

18:10 [33] INFRARED IMAGING OF AN INTEGRATABLE, ROBUST THERMAL FLOW SENSOR WITH A THICK SILICON DIOXIDE MEMBRANE AND THROUGH-GOING SILICON HEAT CONDUCTORS
Kristoffer Palmer, Henrik Kratz, Hugo Nguyen, Greger Thornell, *Ångström Space Technology Centre Uppsala, Sweden,*

18:13 [39] THERMAL BEHAVIOR OF CRYSTALLINE THIN FILM SILICON SOLAR CELLS
Balázs Plesz, *Budapest Univ. of Technology and Economics, Hungary*

18:16 [42] FAST AND ACCURATE THERMAL SIMULATION AND MODELLING OF WORKLOADS OF MANY-CORE PROCESSORS
Bartosz Wojciechowski, Krzysztof Berezowski, Piotr Patronik, Janusz Biernat, *Wroclaw Univ. of Technology, Poland*

18:19 [43] THERMAL CHARACTERISATION OF NOVEL CRYSTALLINE SEMITRANSPARENT SOLAR CELL
Enikő Bándy, **Márta Rencz**, *Budapest Univ. of Technology & Economics, Hungary*

18:22 [46] INVESTIGATING THERMAL PROPERTIES OF 980 NM GAAS PUMP LASER DIODES WITH A PULSED ELECTRICAL TECHNIQUE
El Gibari Mohammed, Yves Scudeller, *Univ. of Nantes, France*

18:25 [47] OPTICAL SPECTROSCOPY FOR THERMAL DIAGNOSTIC OF 980 NM GAAS PUMP LASER DIODES
El Gibari Mohammed, Yves Scudeller, *Univ. of Nantes, France*

18:28 [48] ELECTRO-THERMAL ANALYSIS OF IGBT MODULES WITHIN INVERTERS: EXPERIMENTS AND MODELING
Joe Antonios, Nicolas Ginot, Christophe Batard, Yves Scudeller, *Univ. of Nantes, France*

18:31 [51] OPTIMIZATION OF AN INFRARED SENSOR CARD FOR HARSH ENVIRONMENT PURPOSE
Gyula Horváth, György Bognár, *Budapest Univ. of Technology and Economics, Hungary*

18:34 [56] POWER CONSUMPTION AND TEMPERATURE MEASUREMENTS OF VIRTUALIZATION SOLUTIONS
Marius Marcu, Dacian Tudor, Sebastian Fuicu, *Politehnica Univ. of Timisoara, Romania*

18:37 [58] HOT SPOTS SUPPRESSION BY HIGH THERMAL CONDUCTIVITY FILM IN THIN-SUBSTRATE CHIPS FOR 3D-INTEGRATED LSI SYSTEMS
Fumiki Kato, Katsuya Kikuchi, Hiroshi Nakagawa, Masahiro Aoyagi, *National Institute of Advanced Industries of Science and Technology, Japan*

18:40-20:00 **Poster viewing/Cocktail**

WEDNESDAY 28 SEPTEMBER 2011

09:00-09:40 **INVITED TALK II: NANOPACK PROJECT**
Afshin Ziaei, *THALES Research & Technology, Palaiseau, France*
Chair: **Bernard Courtois**, *CMP, Grenoble, France*

09:40-11:00 **PACKAGE THERMAL ISSUES SESSION**
Chair: **Antonio Rubio**, *Univ. Politècnica de Catalunya, Spain*

09:40 [17] EVALUATION OF THERMAL TRANSIENT CHARACTERIZATION METHODOLOGIES FOR HIGH-POWER LED APPLICATIONS
Stefan Müller, Thomas Zahner, Frank Singer, *OSRAM Opto Semiconductors, Germany*, **Gabriele Schrag, Gerhard Wachutka**, *Institute for Physics of Electrotechnology, Germany*

10:00 [9] THERMAL ANALYSIS OF THE OPEN TYPE OF LASER DIODE
Jong Hwa Choi, *Myong Ji Univ., Korea*, **Moo Whan Shin**, *Yonsei Univ., Korea*

10:20 [5] COMPARATIVE STUDY OF THE EFFECTS OF COALESCED AND DISTRIBUTED SOLDER DIE ATTACH VOIDS ON THERMAL RESISTANCE OF PACKAGED SEMICONDUCTOR DEVICE
Kenny Otiaba, R. S. Bhatti, N.N. Ekere, M. Ekpu , J. Adeyemi, *Univ. of Greenwich, UK*

10:40 [19] NUMERICAL STUDY OF A LIQUID METAL MINI-CHANNEL COOLER FOR POWER SEMICONDUCTOR DEVICES
Mansour Tawk, Yvan Avenas, Afef Lebouc, M. Petit, *G2Elab, France*

11 :00-11:30 Coffee break

11:30-12:30 **RELIABILITY SESSION I**
Chair: **Herming Chiueh**, *National Chiao Tung Univ., Taiwan*

11:30 [6] COMBINED AND ACCELERATED IN-SITU MEASUREMENT METHOD FOR RELIABILITY AND AGING ANALYSES OF THERMAL INTERFACE MATERIALS
Mohamad Abo Ras, **Olaf Wittler**, *Berliner Nanotest and Design GmbH, & Micro Materials Center Berlin e.V*, **R. Haug**, **C. Monory-Plantier**, *Robert Bosch GmbH*, **Daniel May**, *TU Chemnitz*, **R. Schacht**, *Univ. of Applied Sciences Lausitz*, **Bernhard Wunderle**, **B. Michel**, *FhG Institute for Electronic Nano Systems, Chemnitz, Germany*

11:50 [3] ENHANCED PACKAGE- AND DIE-LEVEL DEFECT LOCALIZATION BY DYNAMIC LOCK-IN THERMOGRAPHY
Rudolf Schlangen, Herve Deslandes, Randy Schussler, Ted Lundquist, *DCG Systems Fremont, USA* **Antoine Reverdy**, **Daniel Arias**, *Sector Technologies, France*

12:10 [28] EXPERIMENTAL AND NUMERICAL REINVESTIGATION FOR LIFETIME-ESTIMATION OF PLATED THROUGH HOLES IN PRINTED CIRCUIT BOARDS
Torsten Nowak, Ralph Schacht, Hans Walter, Olaf Wittler, Klaus-Dieter Lang, *FhG Institute Reliability and Microintegration, Berlin*, **Bernhard Wunderle**, *FhG Institute for Electronic Nano Systems*, **Mohamad Abo Ras**, *Berliner Nanotest and Design GmbH, & Micro Materials Center Berlin e.V.*, **Daniel May**, *TU Chemnitz, Germany*

12:30-14:00 Lunch

14:00-15:40 **THERMINATOR SPECIAL SESSION II**
Chair: Vadim Tsoi, *Huawei Technologies, Sweden*

14:00 [50] IMPROVED POWER MODELING IN LOGI-THERMAL SIMULATION
András Timár, György Bognár, Márta Rencz, *Budapest Univ. of Technology & Economics, Hungary*

14:20 [23] A NOVEL SIMULATION ENVIRONMENT ENABLING MULTILEVEL POWER ESTIMATION OF DIGITAL SYSTEMS

Gergely Nagy, András Poppe, *Budapest Univ. of Technology & Economics, Hungary*

14:40 [16] THERMAL MODELING OF 3D STACKS FOR FLOORPLANNING

Sven Reitz, Andy Heinig, Roland Martin, Jörn Stolle, Andreas Wilde, *FhG Institute for Integrated Circuits, Germany*

15:00 [60] HIGH TEMPERATURE CALIBRATION OF A COMPACT MODEL FOR GAN-ON-SI POWER SWITCHES

Steve Stoffels, Denis Marcon, Karen Geens, Xuanwu Kang, Geert Van Der Plas, Marleen Van Hove, Stefaan Decoutere, *IMEC, Belgium*

15:20 [38] SINGLE-CHIP CLOUD COMPUTER THERMAL MODEL

Mohammadsadegh Sadri, Andrea Bartolini, Luca Benini, *Univ. of Bologna, Italy*

15:40-16:10 Coffee break

16:10-16:50 **ADVANCED COOLING METHODS**

Chair: Bernhard Wunderle, *TU Chemnitz, Germany*

16:10 [53] COOLING OF NEXT GENERATION COMPUTER CHIPS: PARAMETRIC STUDY FOR SINGLE AND TWO-PHASE COOLING

Yassir Madhour, Jonathan Olivier, John Thome, *Ecole Polytechnique Fédérale de Lausanne, Switzerland*, **Severin Zimmermann, Dimos Poulikakos**, *ETH Zurich, Switzerland*, **Yassir Madhour, Severin Zimmermann, Bruno Michel**, *IBM Research, Switzerland*

16:30 [10] MODELING OF POWER DEVICES WITH DRIFT REGION INTEGRATED MICROCHANNEL COOLER

Kremena Vladimirova, Yvan Avenas, Jean-Christophe Crebier, Christian Schaeffer, Fabien Lebouc, Mansour Tawk, *G2Elab, France*

16:50-17:10 **VENDORS SESSION**

Chair: Bernard Courtois, *CMP, Grenoble, France*

16:50 2wcl, **Brieuc Turluche**

17:00 CD-adapco www.cd-adapco.com, **Ruben Bons**

17:10 Mentor Graphics®, **Andras Vass-Varnai**

20:00 RESTAURANT LE PROCOPE

A dinner is organized at the restaurant Le Procope in Paris.

Le Procope is located in the heart of the Saint-Germain des Prés district.

Address:
13, rue de l'Ancienne Comédie
75006 PARIS

THURSDAY 29 SEPTEMBER 2011

09:00-10:00 **RELIABILITY SESSION II**

Chair: **Thomas Zahner**,*OSRAM, Germany*

09:00 [13] THERMAL CONTROL MECHANISM WITH IN-SITU TEMPERATURE SENSOR FOR TSV 3D-ICS

Po-Tsang Huang, Tzu-Ting Chiang, Herming Chiueh, Wei Hwang, *National Chiao-Tung Univ., Taiwan*

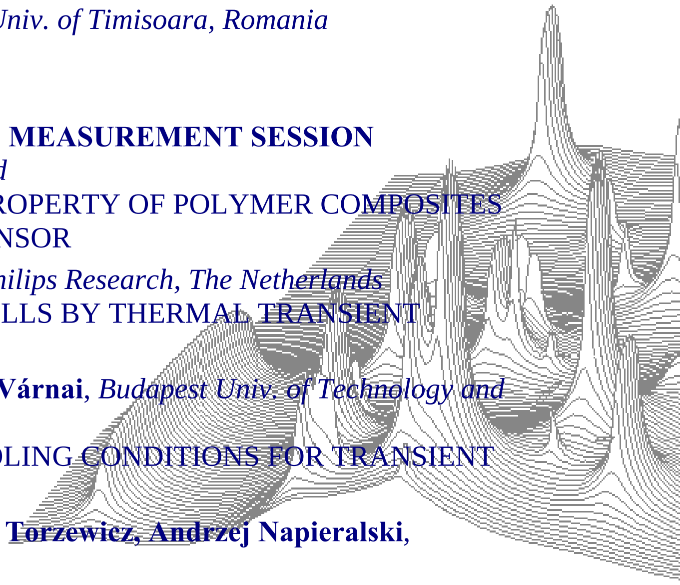
09:20 [30] EXTENSION OF THE SUNRED ALGORITHM FOR ELECTRO-THERMAL SIMULATION AND ITS APPLICATION IN FAILURE ANALYSIS OF LARGE AREA (ORGANIC) SEMICONDUCTOR DEVICES

László Pohl, Ernő Kollár, *Budapest Univ. of Technology and Economics, Hungary*

09:40 [49] EXECUTION FRAMEWORK MODEL FOR POWER-AWARE APPLICATIONS

Marius Marcu, Dacian Tudor, *Politehnica Univ. of Timisoara, Romania*

10:00-10:30 Coffee break



10:30-12:10 **THERMAL CHARACTERIZATION AND MEASUREMENT SESSION**

Chair: **Andrzej Napieralski**, *TU Lodz, Poland*

10:30 [36] IN-SITU ANALYSIS OF THERMAL PROPERTY OF POLYMER COMPOSITES BY EMBEDDED LED TEMPERATURE SENSOR

J.H. Yu, Dmitri Chestakov, Erik Eggink, *Philips Research, The Netherlands*

10:50 [52] CHARACTERIZATION OF SOLAR CELLS BY THERMAL TRANSIENT TESTING

Balázs Plesz, Gyula Horváth, András Vass-Várnai, *Budapest Univ. of Technology and Economics, Hungary*

11:10 [54] ACTIVE CONTROL OF CIRCUIT COOLING CONDITIONS FOR TRANSIENT THERMAL MEASUREMENT PURPOSES

Marcin Janicki, Zbigniew Kulesza, Tomasz Torzewicz, Andrzej Napieralski, *Technical Univ. of Lodz, Poland*

11:30 [29] MEASURING THE THERMAL CONDUCTIVITY OF THERMAL INTERFACE MATERIALS

Pierre-Olivier Chapuis, Lars Schneider, Damian Dudek, Nikolaos Kehagias, Michael Schmidt, Clivia Sotomayor Torres, *ICN, Spain*

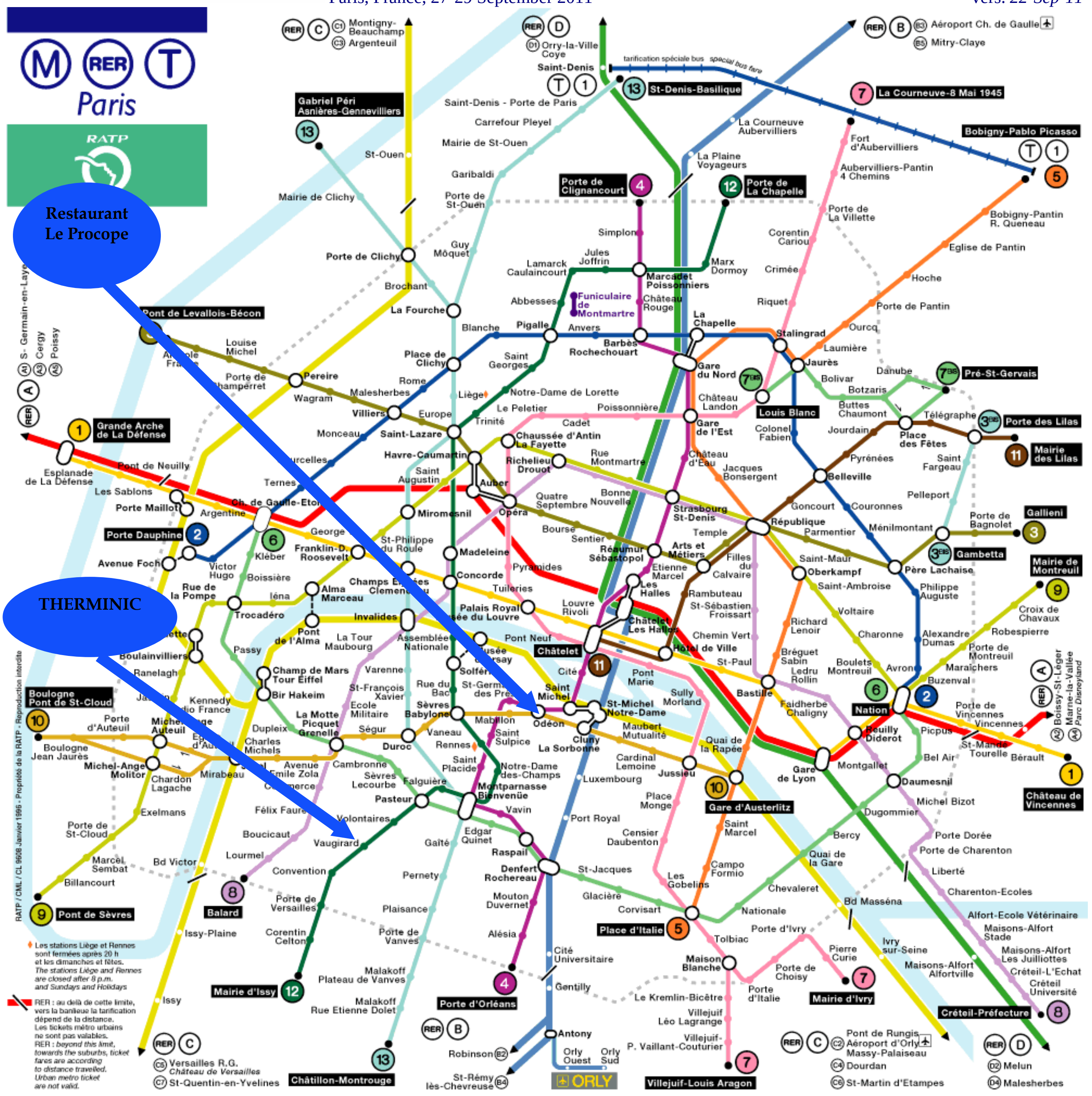
11:50 [25] THERMO-MECHANICAL DEFORMATION MEASUREMENT OF MICROWAVE HIGH POWER AMPLIFIER

Hubert Polaert, Philippe Eudeline, *Thales Air Systems, France,* **Dan Borza, Abdelkhalak Elhami**, *INSA de Rouen, France,* **Jean-Philippe Roux, Eric Larmet**, *CEVAA, France*

12:10-12:20 ***CLOSING REMARKS***

Bernard Courtois, *CMP, Grenoble, France*

12:20-14:00 Lunch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Richelieu Drouot
Rue Montmartre
Bonne Nouvelle
Strasbourg St-Denis
Havre-Caumartin
Saint Augustin
Auber
Opéra
Quatre Septembre
Bourse
Sentier
Réaumur Sébastopol
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Goncourt
Couronnes
Parmentier
Ménilmontant
Père Lachaise
Saint-Maur
Oberkampf
Filles du Calvaire
Saint-Ambroise
Philippe Auguste
Grande Arche de La Défense
Esplanade de La Défense
Pont de Neuilly
Les Sablons
Porte Maillot
Argentine
Ch. de Gaulle-Etoile
Ternes
Courcelles
Miromesnil
Madeleine
St-Philippe du Roule
Franklin-D. Roosevelt
George V
Kléber
Porte Dauphine
Victor Hugo
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Iéna
Alma Marceau
Champs Elysées Clemenceau
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Tuileries
Pyramides
Palais Royal Musée du Louvre
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Etienne Marcel
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Châtelet Les Halles
Rambuteau
St-Sébastien Froissart
Richard Lenoir
Voltaire
Charonne
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Robespierre
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Ledru Rollin
Boulets Montreuil
Avron
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Maraîchers
Buzenval
Nation
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Picpus
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Château de Vincennes
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Massy-Palaiseau
Dourdan
St-Martin d'Etampes
RER D Melun
Malesherbes
RER A S- Germain-en-Laye
Cergy
Poissy
RER A Boissy-St-Léger
Marne-la-Vallée Parc Disneyland
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Les stations Liège et Rennes sont fermées après 20 h et les dimanches et fêtes.
The stations Liège and Rennes are closed after 8 p.m. and Sundays and Holidays
RER : au delà de cette limite, vers la banlieue la tarification dépend de la distance. Les tickets métro urbains ne sont pas valables.
RER : beyond this limit, towards the suburbs, ticket fares are according to distance travelled. Urban metro ticket are not valid.