

1st International Symposium on
Thermal Design and Thermophysical Property for Electronics

eTherm 2008

18-20 June 2008 | Tsukuba, Japan

<http://www.nmij.jp/~mprop-stats/e-therm/>

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1st International Symposium on Thermal Design and Thermophysical Property for Electronics

Phase-change optical disk media, high-density integrated circuit and flat panel display are composed of thin films having thickness of several nanometers to several 100 nanometers. Reliable thermal design can be realized by heat conduction simulation using these reliable thermophysical property values of thin films and boundary thermal resistance values between thin films. In order to know their heat flows and temperature distribution under operation, information of the thermophysical properties of thin films and the boundary thermal resistance between thin films are required. "e-Therm" is the first international symposium focused on thermal design and thermophysical property for electronics including CPU, memory, storage, display, MEMS etc. You are invited to attend at the 1st International Symposium on Thermal Design and Thermophysical Property for Electronics to be held at EPOCHAL TSUKUBA, located in the heart of the Research and Education District in Tsukuba science city on June 18-20, 2008.

Committee

General Chair T. BABA AIST, Japan

Program Committee

A. Onishi	JAXA, Japan	M. Fujii	AIST, Japan
A. Nakaoki	Sony Corp., Japan	P. Gaal	Anter Laboratories, Inc., USA
D. Josell	NIST, USA	S-H. Lee	KRISS, Korea
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M. Yumura	AIST, Japan		

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New Energy and Industrial Technology Development Organization (NEDO)

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SEMI-THERM	
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The Heat Transfer Society of Japan	
The Institute of Electrical Engineers of Japan	
The Institute of Electronics, Information and Communication Engineers	
The Japan Society of Applied Physics	
The Japan Society of Mechanical Engineers	
THERMINIC	

Invited Speakers

Plenary

Peter E. Raad
Southern Methodist Univ., USA



Peter E. Raad received the BSME, MS, and Ph.D. in mechanical engineering from the University of Tennessee at Knoxville. In 1986, he joined the mechanical engineering department at SMU as an Assistant Professor and is currently a Full Professor. He holds the Linda Wertheimer Hart Professorship and is the founding Director of the Linda and Mitch Hart eCenter at SMU. He has received several awards. In 1999-2000, he was named the ASME North Texas Section Engineer of the Year, and in 2006 he received the Harvey Rosten Award.

Plenary

Motoo Fujii
AIST, Japan



Professor Fujii received Dr. of Engineering from Kyushu University in 1978. He became full professor at the Institute of Advanced Material Study, Kyushu University in 1989. He retired from Kyushu University in 2007 and then became the Leader of the Hydrogen Thermophysical Properties Team in the Research Center for Hydrogen Industrial Use and Storage, AIST.

Recently, He developed a sophisticated method to measure the thermal conductivity of individual carbon nanotubes (CNTs) and succeeded to clarify the temperature and diameter dependency of the thermal conductivity of CNTs.

Plenary

Tetsuya Baba
AIST, Japan



Dr. Tetsuya Baba is a prime senior researcher of Advanced Industrial Science and Technology, Japan and the chairman of Working Group 9 responsible for thermophysical property in the Consultative Committee for Thermometry, the International Committee for Weights and Measures. He received doctor of science degree from University of Tokyo in 1979. He received Thermal Conductivity Award at 25th International Thermal Conductivity Conference (1999), 32nd Ichimura Award for distinguished accomplishment in science (2000), and Prize for Science and Technology (Research Category) by MEXT, Japan (2005).

Keynote

Venkat Natarajan
Intel Technology India Pvt. Ltd, India



Dr. Venkat Natarajan is a senior staff engineer at the Systems Research Center, Intel Corporation at Bangalore, India. He leads research and development team on advanced packaging and cooling technologies for future Intel microprocessors. He has a PhD from mechanical Engineering from Carnegie Mellon University and has over 15 years of work experience in the field of electronics cooling. He has worked for Lucent Bell labs, Andrew Corporation and the BOC Group.

Keynote

Niklas Rom
COMSOL AB, Sweden



Niklas Rom received his Ph.D. in chemical engineering at the Royal Institute of Technology in Stockholm, Sweden. Before joining COMSOL he has worked in the thermal power industry. As VP of Engineering at COMSOL, he is manager of global technical customer support and customer training in multiphysics modeling.

Keynote

Xing Zhang
Tsinghua University, China



Professor Zhang earned his PhD at Tsinghua University in 1988. He undertook post-doctoral training at the Institute of Advanced Material Study of Kyushu University, Japan in 1990 and then became an assistant professor there in 1991. He was promoted to be an associate professor at the Institute for Materials Chemistry and Engineering, Kyushu University in 2003 and to be a professor at Department of Engineering Mechanics, Tsinghua University in 2005. Professor Zhang has significant and creative contributions in researches on thermophysical properties of advanced materials, electronic cooling, and applications of ultrasonic techniques to thermal engineering.

Keynote

Ephraim Suhir
University of California Santa Cruz, USA



Dr. Suhir is Distinguished Member of Technical Staff (ret), Physical Sciences and Engineering Research Division, Bell Labs, Murray Hill, NJ. Currently he is on the faculty of the Electrical Engineering Dept., University of California, Santa Cruz, CA. He is also Visiting Professor, Dept. of Mechanical Engineering, University of Maryland, College Park, MD. Dr. Suhir received many distinguished service and professional awards, including: 2004 ASME Worcester Read Warner Medal; 2001 IMAPS John A. Wagnon Technical Achievement Award and many other awards.

Keynote

Yoonho Khang
Samsung Advanced Institute of Technology, Korea



1986 - 1996 Department of Physics
Seoul National University, BA, MA, and Ph.D
1996 - 1999 Post-doctoral fellow
Lawrence Berkeley National Lab, CA, USA
1999 - Samsung Advanced Institute of Technology

Keynote

Ali Shakouri
University of California Santa Cruz, USA



Ali Shakouri is professor of electrical engineering at University of California Santa Cruz. He received his undergraduate degree from Ecole Nationale Supérieure des Telecommunications de Paris, France and Ph.D. from California Institute of Technology in 1990 and 1995, respectively. He is the director of the Thermionic Energy Conversion center, a multi university research initiative. He received the Packard Fellowship in Science and Engineering in 1999, the NSF Career award in 2000 and UCSC School of Engineering FIRST Professor Award in 2004.

1st International Symposium on Thermal Design and Thermophysical Property for Electronics

Program

18 June, 2008

10:00-12:00 Invited Talks

10:00 Plenary
Challenges in Submicron Thermal Measurements and Computations

Peter E. Raad / Southern Methodist University, USA

10:40 Keynote
Thermal and Power Challenges in Emerging Computing Platforms

Venkat Natarajan / Intel Technology India Pvt. Ltd, India

11:20 Keynote
Advanced Multiphysics Couplings with COMSOL Multiphysics : A Guided Tour and Applications to Heat Transfer Modeling

Niklas Rom / COMSOL AB, Sweden

12:00 Lunch

13:20-14:40 Session 1

High Thermal Performance Materials and Devices

13:20
Development of Thermophysical Property Database System for Electronics

Yuichiro Yamashita, Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

13:40
Thermal Conductivity of Nano-Diamond Films Grown by Microwave Plasma Chemical Vapor Deposition

M. Ishihara, K. Tsugawa, J. Kim, M. Hasegawa and Y. Koga, M. Akoshima, S. H. Firoz, K. Ishikawa and T. Baba / Research Center for Advanced Carbon Materials, AIST, Japan

14:00
Mechanical, Thermal and Tribological Properties of Amorphous Carbon Films

Seiichi Miyai, Tomohiro Kobayashi, Takayuki Terai / University of Tokyo, Japan

14:20
High-throughput screening system for Thermoelectric Material Exploration Based on Composition-Spread Approach

M. Otani, N. D. Lowhorn, E. Thomas, W. Wong-Ng, P. K. Schenck, and M. L. Green/ Materials Science and Engineering Laboratory, National Institute of Standards and Technology, USA

14:40 Break

15:20-16:40 Session 2

Thermal Properties of Thin Films and Interfaces

15:20
Measurement of the Thermal and Optical Properties of Optical Disk Materials at High Temperature

Masashi Kuwahara, Osamu Suzuki, Yuzo Yamakawa, Paul Fons, Junji Tominaga, Naoyuki Taketoshi, Takashi Yagi, Tetsuya Baba, Kouichi Tsutsumi, Michio Suzuki / CAN-FOR, AIST, Japan

15:40
Testing the Thermal Resistance of Thermal Interface Materials

Andras Vas-Varnai, Marta Rencz / MicReD Ltd., Hungary

16:00
Current Activity of Thin Film Thermal Diffusivity Standard Using Picosecond Light Pulse Heating Method

Naoyuki Taketoshi, Takashi Yagi, Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

16:20
Development of Thin Film Reference Material for Thermal Diffusivity

Takashi Yagi, Naoyuki Taketoshi, Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

19 June, 2008

9:00-11:00 Invited Talks

9:00 Plenary
Thermal Conductivity Measurements of Individual Carbon Nanotubes and Nanofilms

Motoo Fujii, Xing Zhang / Research Center for Hydrogen Industrial Use and Storage, AIST, Japan

9:40 Keynote
Applicability of Nanofluids to Electronic Cooling

Xing Zhang, Motoo Fujii / Tsinghua University, China

10:20 Keynote
Thermal Stress Related Physical Phenomena in Coated Optical Silica Fibers

Ephraim Suhir / University of California Santa Cruz, USA

11:00 Session 3

Poster Session (See Page 6)

12:00 Lunch

13:20-15:00 Session 4

Advanced Measurement Techniques
in Nano-to-Macro Scale

13:20
Thermoreflectance Microscopy for Thermal Diagnosis of Electronic Devices

Juntaro Ishii, Yukiko Shimizu, Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

13:40
Anisotropic Material Using Integrated Multi-Temperature Probe Method

Eiji Nemoto, Takahiro Gunji, Kyohei Yamashita, Haruki Nukaga / Ibaraki National College of Technology, Department of Mechanical & Systems Engineering, Japan

20 June, 2008

13:20-15:00 Session 4

Advanced Measurement Techniques
in Nano-to-Macro Scale

14:00

A Novel Interface Thermal Resistance Meter

Peter S. Gaal, Marc-Antoine Thermitus, and Silviu Apostolescu / Anter Corporation, Pittsburgh, Pennsylvania, USA

14:20

Thermal Diffusivity of the Carbon Nanotube Forest Measured by the Laser Flash Method

Megumi Akoshima, Kenji Hata, Don Futaba, Kohei Mizuno, Tetsuya Baba, Motoo Yumura / National Metrology Institute of Japan, AIST, Japan

14:40

Observation of Thermal Transfer of Pt Thin Film at Low Temperature Using Femtosecond Thermoreflectance Technique

Fumishige Nakamura, Takashi Yagi, Naoyuki Taketoshi, Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

15:00 Break

15:20-17:00 Session 5 Vender Session

15:20

Measuring Instrument for Thermal Diffusivity of Thin Films

Shakhawat H. Firoz, Kazuko Ishikawa, Takashi Yagi, Naoyuki Taketoshi, Tetsuya Baba, / National Metrology Institute of Japan, AIST, Japan

15:40

An Invitation for Heat Designing Using CFD - On the Edge and Future Forecasting of Electronics Cooling Design

Masayuki Kuba / SOFTWARE CRADLE CO., LTD., Japan

16:00

Distribution Resolution of Distribution Measurement Instrument in Local Area Using Thermal Probe

Satoaki Ikeuchi, Kenji Shimada, Youichi Takasaki, Yoshikazu Ishii, Atsushi Yamamoto / Ulvac-Riko, Inc., Research and Development Department, Japan

16:20

Design of a Portable Emittance Measurement System and Portable Solar Absorptance Measurement System of Spacecraft Thermal Design

Akira Ohnishi, Shiho Nakauchi, Kouji Yamaguchi, Haruna Oonishi / ORBITAL Engineering Inc. / Ube Industries, Ltd., Japan

16:40

Thermal Conductivity Testing - Approaches with the TPS X500 - Series

Mattias Gustavsson / Hot Disk AB, Sweden

18:00-20:00 **Banquet (Okura Frontier Hotel)**

9:40-11:00 Invited Talks

9:40 Keynote

Thermal Management in Phase Change Memory Devices

Yoonho Khang, Cheolkyu Kim, Tae-Yon Lee, Dong-Seok Suh, Youn-Seon Kang, Kijoon H. P. Kim, Tae Sang Park, and David G. Cahill / Samsung Advanced Institute of Technology, Korea

10:20 Keynote

High Speed Transient Characterization and Simulation of Integrated Circuits

Ali Shakouri / University of California Santa Cruz, USA

11:00 Break

11:20-12:40 Session 6

Thermal Design and Thermal Simulation

11:20

Air Cooling Augmentation in an Array of Heated Electronic Modules by Horizontal Circular and Semicircular Cylindrical Cross Flow Barriers

S. G. Bhatta and T. R. Seetharam / Department of Mechanical Engineering, P. E. S. Institute of Technology, Bangalore India, India

11:40

An Innovative Architecture of Thermal Solution for Microprocessors

Chuan Hu, Denial Lu, Gilroy Vandentop / Components Research AZ Intel Corp., USA

12:00

Characteristics of Thermal Energy Transport in the Wave Front at the Different Heating Durations

Tatiana N. Zolotoukhina, Hiroki Kawaguchi, Toshihiro Iwaki / Toyama University, Faculty of Engineering, Japan

12:20

Thermal Modeling of Electronic Packages

Hitoshi Sakamoto, Kazuyuki Mikubo / NEC Corporation, Japan

12:40-13:20 Closing Session

12:40 Plenary

Light Pulse Heating Thermoreflectance Methods for Thermophysical Property Measurements of Thin Films

Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

13:20 Lunch

14:30 **Lab Tour (AIST)**

17:00 Break up

Poster Session

P1 Effects of substrate temperature on properties of ITO films deposited on PET substrate by DC magnetron sputtering

Dong Yeop Lee, Jung Rak Lee, Gun Hwan Lee, Pung Keun Song / Pusan National University, Department of Material Science and Engineering, Korea

P2 Thermophysical Behaviors of Glass Frits in Ag Pastes during a Fast Firing

Dongsun Kim, Seungbo Shim, Seongjin Hwang, Hyungsun Kim / School of Materials Engineering, Inha University, Korea

P3 Duration-based Optimization on Anisotropic Axis Angle of Thermal Expansion Coefficient of Reinforced Carbon/Carbon Nose Cone

GENG Xiangren, GUI Yewei, TANG Wei, and HE Lixin / China Aerodynamics Research and Development Center, China

P4 Evaluation of Thermophysical Properties of Ti Thin Film by Thermoreflectance Technique

Genzou MATSUI, Takashi YAGI, Hideyuki KATO / Bethel Co. Ltd., Japan

P5 Accuracy Verification of Steady State Comparative-Longitudinal Heat Flow Method Using Specimen of Different Thickness for Measuring Thermal Conductivity of Lotus-type Porous Metals

Hiroshi Chiba, Tetsuro Ogushi, Hideo Nakajima, Shunkichi Ueno, Kahoru Torii, Toshio Tomimura, Fumio Ono / Advanced Technology R & D Center, Mitsubishi Electric Corporation, Japan

P6 Specific Heat Capacity Measurements of Solid Using a Differential Scanning Calorimeter - Measurement Accuracy for Metallic Disk Specimens -

Junichi Fujino, Tomohiro Honda / Fukuoka University, Department of Mechanical Engineering, Japan

P7 Analysis of Thermophysical Properties for Insulator Oxide Films Using a Thermoreflectance Method

Ryo Arisawa, Takashi Yagi, Naoyuki Taketoshi, Tetsuya Baba, Amica Miyamura, Yasushi Sato, Yuzo Shigesato / Aoyama Gakuin University, Department of Chemistry School of Science & Engineering, Japan

P8 Microstructure and Electrical Properties of Sm- or Yb- Doped ITO Films Prepared by d.c. Magnetron Sputtering

Sang Hyun Cho, Sung Ryong Choi, Han Ho Yon, Kwang Ho Kim, Pung Keun Song / Pusan National University, Department of Materials Science and Engineering, Korea

P9 Smart Radiation Device for Spacecraft

S. Tachikawa and A. Ohnishi / Japan Aerospace and Exploration Agency, Institute of Space and Astronautical Science, Japan

P10 Wireless 3200 Channels Temperature Measurement System

S. Tachikawa and A. Ohnishi / Japan Aerospace and Exploration Agency, Institute of Space and Astronautical Science, Japan

P11 Thermal Diffusivity Measurement of AlN Films Deposited by RF Reactive Magnetron Sputtering Using Nanosecond Thermoreflectance Technique

Takashi Okabe, Tetsuro Ohtsuka, Takashi Yagi, Naoyuki Taketoshi, Tetsuya Baba, Amica Miyamura, Yasushi Sato, Yuzo Shigesato / Aoyama Gakuin University, Department of Chemistry School of Science & Engineering, Japan

P12 Study On Thermal Conductivity Measurement of Suspended Metal Films by Using NEMS Technology

Yohei Ito, Koji Takahashi, Tatsuya Ikuta, Xing Zhang / Kyushu University, Japan

P13 Extension of Areal Heat Diffusion Time Method: Generalization of Boundary Condition

Kenichi Kobayashi, Tetsuya Baba / National Metrology Institute of Japan, AIST, Japan

Japanese Journal of Applied Physics (JJAP) special issue

The proceedings of e-Therm 2008 will be published as a special issue, entitled with "Thermal Design and Thermophysical Property for Electronics", from Japanese Journal of Applied Physics.

Exhibition

AIST Innovation Center for Start-ups

<http://unit.aist.go.jp/incs/cie/index.html>

NanoTR, a measuring instrument has been developed successfully which is the world's first instrument can measure thermophysical properties of metal, ceramic and dielectric films in less than 1 minutes. Phase-change optical disk media, high-density integrated circuit and flat panel display comprised of several 100 nanometers to several 10 micrometers thick of thin films can be measured.

Bethel Co., Ltd.

<http://www.bethel.co.jp/eng/index.html>

Thermal Microscope TM3 (New Version)

1. Light heating thermoreflectance method
2. Thermal effusivity of a material is measured without physical contact.
3. $\Phi 3 \mu\text{m}$ spatial resolution.
4. Measure thin film by change frequency of heating .
5. Materials: Bulk, thin film on substrate, plastics, ceramics, metal, and SiC.

Thermowave Analyzer TA (New Product)

1. Measure thermal diffusivity of a material without physical contact.
2. Measurement range is from $10 \mu\text{m}$ to several mm.
3. Wide dynamic range. Able to measure Diamond.
4. Easy to measure.
5. No restriction for the shape of samples.

Bruker AXS K.K.

<http://www.bruker-axs.de/>

We exhibit new flash analyzer LFA 447 NanoFlash
Quick and easy determination of thermo physical properties

Keisoku Engineering System Co.,Ltd.

<http://www.kesco.co.jp/index.html>

A heat transfer phenomenon influences many problems. COMSOL Multiphysics? enables the calculation of many phenomena by Multiphysics. COMSOL Multiphysics environment facilitates all steps in the modeling process. Easy set up, COMSOL Multiphysics have predefined modeling interfaces for applications ranging from fluid flow, heat transfer, structural mechanics and electromagnetic analyses. You as the user, also have the option of choosing different physics from the Multiphysics menu and defining the interdependencies yourself. Or you can specify your own Partial Differential Equations, and couple them with other equations and physics. COMSOL Multiphysics operates as the primary tool for all your future modeling needs.

KYOTO ELECTRONICS MANUFACTURING CO., LTD.

<http://www.kyoto-kem.com/en/>

KEM is going to display

*Thermophysical Properties Analyzer "TPS-1500"

*Quick Thermal Conductivity Meter "QTM-500"

*Portable Heat Flow Meter "HFM-215" and more, various Heat Physical Properties Measurement Instruments.

National Metrology Institute of Japan, AIST

<http://www.nmij.jp/english/>

Network database system for thermophysical property data has a new concept that data registrants keep having a responsibility for data production, registration and update. More than 9000 thermophysical property data have been opened without any charge. Especially for vapor pressure and surface tension of organic material in fluid state and thermal conductivity of metal and semiconductor in state solid, a lot of data are collected. In the exhibition booth, you can learn about how to use our powerful database system.

ORBITAL Engineering Inc.

**Joint exhibition*

<http://www.orbital-e.co.jp/>

Ube Industries, Ltd.

<http://www.ube-ind.co.jp/english/index.htm>

*Measurement System Emittance(ϵ) Soalr Absorptance(α)
Wireless Temperature
*Thermal/Flued Analysis Software

REPIC CORPORATION

<http://www.repic.co.jp/>

High quality, high performance coaxial connectors, cables, and assemblies by Huber+Suhner, Switzerland.

SOFTWARE CRADLE CO., LTD.

<http://www.cradle.co.jp/en/index.htm>

We exhibit our CFD (Computational Fluid Dynamics) packages, mainly ""Heat Designer"". This application is widely used among engineers for thermal designing of electronic devices, electronic cooling devices, and so on.

By Using CFD you are able:

*To increase insights about your products by making the invisible VISIBLE

*To forecast the performance of your products by investigating "what if" questions

*To reduce the development cost and lead time by reducing the try-and-errors with prototype.

We also exhibit lots of animations of industry application examples. Please visit our booth and discuss your problems.

ULVAC-RIKO, Inc.

http://www.ulvac-riko.co.jp/English/index_eng.htm

The Scanning Thermal Probe Micro-analyzer (STPM) is an instrument for simultaneous measuring the distribution of Seebeck coefficient and thermal conductivity. STPM is applied for several evaluations, such as simple distribution evaluation of performance in thermoelectric materials, distribution evaluation of thermophysical property in functionally graded materials, distribution evaluation in useful materials such as CPU, and evaluation of thermophysical property in samples, which it is difficult to measure using general instruments.



BETHEL Co., Ltd.



計測エンジニアリングシステム株式会社



KYOTO ELECTRONICS MANUFACTURING CO., LTD.



REPIC 林栄精器株式会社



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アルバック理工株式会社
ULVAC-RIKO, Inc.

Venue

Tsukuba International Congress Center (EPOCHAL TSUKUBA)

Takezono 2-20-3, Tsukuba, Ibaraki, 305-0032, Japan
TEL : 029-861-0001 FAX : 029-861-1209

Access

Express Bus from Haneda Airport to Tsukuba

Bus Stop: No.13 at Terminal 1, No.13 at Terminal 2
Travel time: 100 min. Ticket: JPY 1,800
You can purchase tickets at the KEISEI counter in the airport.

Express Bus from Tokyo Station to Tsukuba

Bus Stop: No.2 at Yaesu south exit
Travel Time: 65 min. Ticket: JPY 1,150

Tsukuba Express (TX)

Travel Time: 45 min. (Express) from Akihabara Station
Ticket: JPY 1,150
Get off at Tsukuba Station and take exit A3.

From Tsukuba Center (TX Tsukuba Station) to EPOCHAL TSUKUBA

