

SYMPOSIUM NM2

Nanoscale Heat Transport—From Fundamentals to Devices
April 18 - April 21, 2017

Symposium Organizers

Pierre-Olivier Chapuis, Center for Energy and Thermal Sciences,
CNRS - INSA Lyon

Aleksandr Chernatynskiy, Missouri University of Science and
Technology

Kedar Hippalgaonkar, Nanyang Technological University
Austin Minnich, California Institute of Technology

Proceedings Statement

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* Invited Paper

TUTORIAL

Understanding Nanoscale Heat Transport—Interplay between Experiment and Theory

Monday Afternoon, April 17, 2017

1:30 PM – 5:00 PM

PCC West, 100 Level, Room 101 BC

The tutorial will provide an overview of experimental and theoretical techniques for understanding and manipulating thermal transport in nanoscale materials. Particular attention will be devoted to the techniques aimed at understanding the quasi-ballistic transport regime where the characteristic length scales are smaller than the mean-free paths of heat carriers. The importance of combining theory and experiment in making significant progress on this subject will be illustrated throughout the tutorial.

1:30 PM - 3:00 PM

Part I: **Keivan Esfarjani**

The first part of the tutorial will outline the limitations of Fourier law at length scales on the order of 10 to 100 nm, where a big portion of heat is carried ballistically since phonon mean-free paths, typically in silicon, span a wide range from nm to tens or hundreds of microns. Consequently, new theoretical methodologies need to be developed to describe propagation of heat in nanostructured samples. The tutorial will describe the latest theoretical methodologies that have been developed in order to model heat transport in various types of materials, from bulk to superlattices to amorphous materials, and discuss their success and limitations when compared to experimental data.

3:00 PM BREAK

3:30PM - 5:00 PM

Part II: **Richard Wilson**

The second part of the tutorial will provide an overview of recent advances in experimental techniques for studying nanoscale thermal transport and discuss how they can be used to rigorously test transport theories. Topics will include how advances in optical techniques, such as time domain thermoreflectance, and steady-state techniques based on micro fabricated test structures are enabling transport theories to be experimentally tested across a diverse array of physical systems, e.g. solid-solid interfaces, superlattices and multilayers, anisotropic 2D materials, and nanoscale metal multilayers. Special emphasis will be placed on recent experimental advances in characterizing the thermal response of insulating and semiconducting materials in the quasi-ballistic limit, which enable tests of state-of-the-art density-functional theory predictions for phonon mean-free paths.

Instructors

Keivan Esfarjani, University of Virginia

Richard Wilson, University of California, Riverside

SESSION NM2.1: Thermal Transport in 2D Materials I

Session Chair: John Bischof

Tuesday Morning, April 18, 2017

PCC West, 100 Level, Room 101 BC

10:30 AM *NM2.1.01

Thermal Properties of 2D Semiconductors—Theory and Application **Gang Zhang**; Institute of High Performance Computing, Singapore.

11:00 AM NM2.1.02

Nanoscale Characterization of the Thermal Conductivity of Supported Graphite Nanoplates, Graphene and Few-Layer Graphene **Mauro Tortello**; Politecnico di Torino, Italy.

11:15 AM NM2.1.03

Understanding and Tuning Heat Conduction in MoS₂—Cross-Plane Diffusive-Ballistic Transport and Dynamic Electrochemical Tuning of Thermal Conductivity by Li Intercalation **Aditya Sood**; Stanford University, United States.

11:30 AM *NM2.1.04

Thermal Transport in Two-Dimensional Materials and Devices **Eric Pop**; Stanford University, United States.

SESSION NM2.2: Multiphase Thermal Transport

Session Chair: Olle Hellman

Tuesday Afternoon, April 18, 2017

PCC West, 100 Level, Room 101 BC

1:30 PM *NM2.2.01

Evaporative Processes and Mass Accommodation Coefficient via Molecular Dynamics **Pawel Koblinski**; Rensselaer Polytechnic Institute, United States.

2:00 PM *NM2.2.02

Nanoparticle Heating to Improve Therapeutics, Diagnostics and Regenerative Medicine **John Bischof**; University of Minnesota, United States.

2:30 PM NM2.2.03

Probing Nanoscale Heat Transport in Liquid Environments—Contact and Non-Contact Immersion Scanning Thermal Microscopy (iSThM) **Oleg Kolosov**; Lancaster University, United Kingdom.

2:45 PM NM2.2.04

Boiling at the Nanoscale—Nanobubbles around Hot Nanoparticles and Heat Phase Change of Nanofluids **Merabia Samy**; Universite de Lyon, CNRS, UCBL, ILM, France.

3:00 PM BREAK

SESSION NM2.3: Phonon Properties

Session Chair: Pawel Koblinski

Tuesday Afternoon, April 18, 2017

PCC West, 100 Level, Room 101 BC

3:30 PM *NM2.3.01

Strongly Anharmonic Materials from First Principles with the Temperature Dependent Effective Potential Method **Olle Hellman**^{1,2}; ¹California Institute of Technology, United States; ²Linköping University, Sweden.

4:00 PM NM2.3.02

Phonon Properties and Slow Organic-to-Inorganic Sub-Lattice Thermalization in Hybrid Perovskites **Yi Xia**; Argonne National Laboratory, United States.

4:15 PM NM2.3.03

Direct Observation of Confined Acoustic Phonon Branches in Individual Free-Standing Semiconductor Nanowires [Fariborz Kargar](#); University of California, Riverside, United States.

4:30 PM NM2.3.04

Monte Carlo Simulation of Thermal Transport in Fractal Nonperiodic Multilayer Structures with Power Law Layer Thickness Dependence [Amr M. Mohammed](#)^{1,4}; ¹Purdue University, United States; ⁴Purdue University, United States.

4:45 PM NM2.3.05

Anderson-Like Localisation of Phonon in Nanostructures [Yann Chalopin](#); CNRS-Ecole Centrale Paris, France.

SESSION NM2.4: Poster Session I: Heat Transport at the Nanoscale
Tuesday Afternoon, April 18, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

NM2.4.01

Size Dictated Thermal Conductivity of GaN [Thomas Beechem](#); Sandia National Labs, United States.

NM2.4.02

Heat Conduction Tuning Based on the Wave Nature of Phonons [Masahiro Nomura](#)^{1,4,5}; ¹Institute of Industrial Science, the University of Tokyo, Japan; ⁴Institute for Nano Quantum Information Electronics, the University of Tokyo, Japan; ⁵PRESTO, JSTA, Japan.

NM2.4.03

Ballistic Phonon Transport in Si Nanowires [Roman Anufriev](#); University of Tokyo, Japan.

NM2.4.04

Microelectronics Thin Films and Boundaries Characterized by Scanning Thermal Microscopy [Axel Pic](#)^{1,2}; ¹STMMicroelectronics, France; ²CNRS - INSA Lyon, France.

NM2.4.05

Effects of Grain Boundaries and Defects on Anisotropic Magnon Transport in Textured Sr₁₄Cu₂₄O₄₁ [Xi Chen](#); University of Texas at Austin, United States.

NM2.4.06

Kapitza Resistance and the Thermal Conductivity of Amorphous Superlattices [Ashutosh Giri](#); University of Virginia, United States.

NM2.4.07

Scattering of Longitudinal Acoustic Phonons in Thin Silicon Membranes [Dhruv Gelda](#); University of Illinois at Urbana-Champaign, United States.

NM2.4.08

Sub-Amorphous Thermal Conductivity in Amorphous Heterogeneous Nanocomposites [Jaeyun Moon](#); California Institute of Technology, United States.

NM2.4.09

Revisiting the Theory of Disordered Alloy Thermal Conductivity [Hamidreza Seyfi](#); Georgia Institute of Technology, United States.

NM2.4.10

Synthesis and Characterization of Boron Arsenide Crystals [Fei Tian](#); University of Houston, United States.

NM2.4.11

Calibrated Sub-Micron Temperature Measurement of an Operating Plasmonic HAMR Device by Thermoreflectance Imaging [Gregory Hohensee](#); Western Digital Corporation, United States.

NM2.4.12

Pump-Probe Measurements of Thermal Conductance of Amorphous and Metallic Interfaces for Nanoscale Thermal Management in Heat-Assisted Magnetic Recording [Gregory Hohensee](#); Western Digital Corporation, United States.

NM2.4.13

Refinement of Polymer Imprint Thermal Mapping for Accurate AFM-Based Temperature Mapping of Nanoscale, Plasmonic, Heat-Assisted Magnetic Recording Heads [Gregory Hohensee](#); Western Digital Corporation, United States.

NM2.4.14

Ray Tracing Simulations of Incoherent Phonon Boundary Scattering in Silicon Nanomeshes [Geoffrey Wehmeyer](#); University of California, Berkeley, United States.

NM2.4.15

Spin Mediated Thermal Transport in p-Si [Paul C. Lou](#); University of California, Riverside, United States.

NM2.4.16

Magneto-Thermal Transport Behavior in Ferromagnetic and Semiconductor Thin Films [Paul C. Lou](#); University of California, Riverside, United States.

NM2.4.17

Broadening of Thermal Surface Wave Spectrum on SiO₂ Thin Film from Near-Infrared to Far-Infrared due to Zenneck Modes [Sergei Gluchko](#); Paris-Saclay University, France.

NM2.4.18

Hydrogen-Induced Thermal Conductivity Change across Metal-Insulator Transition in Amorphous WO₃ Film [Ayano Nakamura](#)^{1,2}; ¹Nagoya University, Japan; ²Nagoya University, Japan.

NM2.4.19

The Enhancement of Thermal Conductivity of Polyvinyl Alcohol Nanofiber Membrane [Meng An](#)^{1,2}; ¹Huazhong University of Science and Technology, China; ²Huazhong University of Science and Technology, China.

NM2.4.20

The Adjustable Thermal Resistor By Reversibly Folding a Graphene Sheet [Meng An](#)^{1,2}; ¹Huazhong University of Science and Technology, China; ²Huazhong University of Science and Technology, China.

NM2.4.21

Solution-Phase Processing Routes to Metal Chalcogenide Thermoelectric Thin Films [Robert Y. Wang](#); Arizona State University, United States.

NM2.4.22

Sound Attenuation in Amorphous Silica at Frequencies near the Boson Peak [Zhi Liang](#); California State University, Fresno, United States.

NM2.4.23

Coherent Control of Thermal Conductance in Hole- and Pillar-Based Phononic Crystals [Roman Anufriev](#); The University of Tokyo, Japan.

NM2.4.24

Thermal Phonon MFP Spectrum Probing Using Phononic Crystals [Masahiro Nomura](#)^{1,2}; ¹University of Tokyo, Japan; ²Japan Science and Technology Agency, Japan.

NM2.4.25

Interlayer Thermal Conductance within Phosphorene and Graphene Bilayer [Yang Hong](#); University of Nebraska Lincoln, United States.

NM2.4.26

Non-Contact Measurement of In-Plane Thermal Anisotropy in Polymer Films Using Transient Grating Spectroscopy [Andrew Robbins](#); California Institute of Technology, United States.

NM2.4.27

Near Field Thermal Properties of Meso and Nanoporous Systems [Raul Esquivel-Sirvent](#); Universidad Nacional Autonoma de Mexico, Mexico.

NM2.4.28

Thermal Conduction in Homologous In₂O₃(ZnO)_m Films [Junjun Jia](#); Aoyama Gakuin University, Japan.

NM2.4.29

External Electric Field Driving Ultra-Low Thermal Conductivity of Silicene [Guangzhao Qin](#); RWTH Aachen University, Germany.

NM2.4.30
Methodology for Electronic Thermal Conductivity of Metals from Direct Non-Equilibrium Ab Initio Molecular Dynamics Simulation [Sheng Ying Yue](#); RWTH Aachen University, Germany.

NM2.4.31
Out-of-Plane Thermal Transport in Multiplayer Stanene [Jingchao Zhang](#); University of Nebraska Lincoln, United States.

NM2.4.32
Experimental Investigation of Thermal Transport in Periodic Cellular Nanotrusses [Nicholas Dou](#); California Institute of Technology, United States.

NM2.4.33
The Thermal Conductivity of Actinide Materials—A New Experimental Approach [Keshav Shrestha](#); Idaho National Laboratory, United States.

NM2.4.34
Daytime Radiative Cooling Using Glass Slides [Junlong Kou](#); California Institute of Technology, United States.

NM2.4.35
Dual-Mode Raman Method to Measure In-Plane and Interfacial Thermophysical Properties of 2D Van der Waals Heterostructures [Qinyi Li](#); Kyushu University, Japan.

NM2.4.36
Breaking the Amorphous Limit to Reach Ultralow Thermal Conductivity by Nanostructuring [Yanguang Zhou](#); AICES, RWTH-Aachen University, Germany.

NM2.4.37
Nonmonotonic Diameter Dependence of Thermal Conductivity of Extremely Thin Si Nanowires—Competition between Hydrodynamic Phonon Flow and Boundary Scattering [Yanguang Zhou](#); AICES, RWTH-Aachen University, Germany.

NM2.4.38
Importance of the Hubbard Correction on the Thermal Conductivity Calculation of Strongly Correlated Materials—A Case Study of ZnO [Zhiting Tian](#); Virginia Tech, United States.

NM2.4.39
Phonon Dispersion of Boron Arsenide from Inelastic X-Ray Scattering—Great Potential for Ultrahigh Thermal Conductivity [Zhiting Tian](#); Virginia Tech, United States.

NM2.4.40
Thermal Emission of Homogeneous Spheres—Regimes and Optimization [Pierre-Olivier Chapuis](#); CNRS - INSA Lyon, France.

NM2.4.41
Near-Field Thermal Radiation Exchanged by a Plasmonic Metal Particle and a Surrounding Bubble [Pierre-Olivier Chapuis](#); CNRS - INSA Lyon, France.

NM2.4.42
The Role of Low Energy Phonons in Nanocrystalline Si and SiGe—An Ab Initio Based Study [Lina Yang](#); California Institute of Technology, United States.

NM2.4.43
Mode-Resolved Transmission Coefficients for Thermal Phonons at Heterogeneous Interfaces Using Atomistic Green's Functions [Benoit Latour](#); California Institute of Technology, United States.

NM2.4.44
Transient Thermal Conduction in Nanoscale Copper Architectures with Embedded Phase Change Material [Michael T. Barako](#)^{1,2}; ¹NG NEXT, Northrop Grumman, United States; ²Stanford University, United States.

NM2.4.45
Phonon Scattering Pathways in Complex Polymers Using Anharmonic Lattice Dynamics [Peishi Cheng](#); Caltech, United States.

NM2.4.46
Visible and Near Infrared Absorption Characteristics of Oxygen Deficient Strontium Titanate [Sofie Ravesteijn](#); University of Virginia, United States.

NM2.4.47
Universality of Temperature Scaling in Self-Heated Percolating Silver Nanowires Networks [Amr M. Mohammed](#)^{1,2}; ¹Purdue University, United States; ²Purdue University, United States.

SESSION NM2.5: Thermal Transport in 2D Materials II
 Session Chair: [Emigdio Chavez-Angel](#)
 Wednesday Morning, April 19, 2017
 PCC West, 100 Level, Room 101 BC

8:00 AM *NM2.5.01
Probing Energy Carrier Transport and Coupling in Low-Dimensional and Complex Structures [Li Shi](#); The University of Texas at Austin, United States.

8:30 AM NM2.5.02
Thermal Switching with Collapsible Graphene Membranes [Michelle Chen](#); Stanford University, United States.

8:45 AM NM2.5.03
Thermal Transport Measurement of Sub-10 nm Single- and Bi-Layer Graphene Nanomesh Structures by Block Copolymer Lithography [Jinwoo Oh](#)^{1,2}; ¹Korea Institute of Science and Technology, Korea (the Republic of); ²Seoul National University, Korea (the Republic of).

9:00 AM NM2.5.04
Thermoelectric Measurements of Graphene Antidot Lattices on Boron Nitride [Qing Hao](#); University of Arizona, United States.

9:15 AM NM2.5.05
Thermal Boundary Conductance between Monolayer MoS₂ and SiO₂ via In Situ Raman Spectroscopy of Functioning MoS₂ Transistors [Eilam Yalon](#); Stanford University, United States.

9:30 AM NM2.5.06
Ballistic Phonon Conduction in Silicon Nanobeam Labyrinths [Woosung Park](#); Stanford University, United States.

9:45 AM BREAK

SESSION NM2.6: Phononic Crystals
 Session Chair: [Li Shi](#)
 Wednesday Morning, April 19, 2017
 PCC West, 100 Level, Room 101 BC

10:15 AM *NM2.6.01
Thermal Transport in Si Phononic Crystals [Emigdio Chavez-Angel](#)^{1,5}; ¹Catalan Institute of Nanoscience and Nanotechnology ICN2, Spain; ²JG University of Mainz, Germany.

10:45 AM NM2.6.02
Heat Focusing by Phononic Nanostructures [Roman Anufriev](#); The University of Tokyo, Japan.

11:00 AM *NM2.6.03
Coherent Modification of Thermal Properties Using Phononic Crystals [Ilari Maasilta](#); University of Jyväskylä, Finland.

11:30 AM NM2.6.04
Experimental Investigation of Phonon Coherence and Backscattering Using Silicon Nanomeshes [Jaeho Lee](#)^{1,3}; ¹University of California, Irvine, United States; ³Lawrence Berkeley National Laboratory, United States.

11:45 AM NM2.6.05
Understanding and Manipulating Coherent and Incoherent Phonon Transport in Multilayered Structures [Yan Wang](#); University of Nevada, Reno, United States.

SESSION NM2.7: Phonons in Materials

Session Chair: Woochul Kim
Wednesday Afternoon, April 19, 2017
PCC West, 100 Level, Room 101 BC

1:30 PM *NM2.7.01

Thermal Conduction in van der Waals Materials [Junqiao Wu](#); University of California, Berkeley, United States.

2:00 PM NM2.7.02

Periodicity Dependent Heat Dissipation Efficiency in 2D Confined Nanoscale Heat Source Arrays [Nico Hernandez Charpak](#); University of Colorado at Boulder, United States.

2:15 PM NM2.7.03

Ballistic Effects on Thermal Conductivity in 1D and 2D Configurations from Single and Multiple Localized Sub Mean Free Path Heat Sources—A Numerical Investigation [Elyes Nefzaoui](#)^{1,2}; ¹ESIEE Paris, France; ²Laboratoire ESYCOM (EA2552), France.

2:30 PM BREAK

SESSION NM2.8: Thermoelectrics and Compounds

Session Chair: Ilari Maasilta
Wednesday Afternoon, April 19, 2017
PCC West, 100 Level, Room 101 BC

3:30 PM *NM2.8.01

Structural Variations in Thermoelectric Device Geometry for Low S/W and Wearable System [Woochul Kim](#); Yonsei University, Korea (the Republic of).

4:00 PM NM2.8.02

Modulation of Thermoelectric Properties of Carbon Nanomaterials [Masato Ohnishi](#); The University of Tokyo, Japan.

4:15 PM NM2.8.03

Acoustic Phonons Lifetime and Thermal Conductivity in Complex Thermoelectric Crystal Structure [Stephane Pailhes](#); ILM, University Lyon, CNRS, France.

4:30 PM NM2.8.04

Effect of the High-Pressure Spin Transition in Mg-Fe-O System on Thermal Conductivity [Aleksandr V. Chernatynskiy](#); Missouri University of Science and Technology, United States.

4:45 PM NM2.8.05

Magnetic Martensitic Transformation and Thermal Transport in $Mn_{1-x}MGe$ (M = Co, Ni) [Qiye Zheng](#); University of Illinois at Urbana-Champaign, United States.

SESSION NM2.9: Poster Session II: Heat Transport at the Nanoscale

Wednesday Afternoon, April 19, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

NM2.9.01

Interfacial Thermal Transport across Graphene and Organic Semiconductor [Xinyu Wang](#); The University of Hong Kong, Hong Kong.

NM2.9.02

Monitoring Heat Dissipation from Gold Nanorods to the Ambient Water through Conjugated Ligands with Atomic Resolution [Yuexiang Yan](#); National University of Singapore, Singapore.

NM2.9.03

A Novel Phonon Monte Carlo Simulator for Calculating Thermal Conductivities [Abdul R. Shaik](#); Arizona State University, United States.

NM2.9.04

Intrinsic Localized Mode and Low Thermal Conductivity of PbSe [Nina Shulumba](#); California Institute of Technology, United States.

NM2.9.05

Phonon Heat Conduction under Large Thermal Gradient in Optically Heated Nanoline Arrays [Xiangwen Chen](#); California Institute of Technology, United States.

NM2.9.06

Thermal Measurements of Nanoporous $In_{0.1}Ga_{0.9}N$ Thin Films Directly Grown by Metalorganic Chemical Vapor Deposition [Dongchao Xu](#); University of Arizona, United States.

NM2.9.07

Thermal Conductivities of Epitaxial Al-Doped and ZnO Thin Films Deposited by Magnetron Sputtering [Junjun Jia](#); Aoyama Gakuin Univ, Japan.

NM2.9.08

Influence of a nm-Sized Metallic Interlayer on Metal-Dielectric Thermal Boundary Conductance [Maite Blank](#); EPFL, Switzerland.

NM2.9.09

Four-Phonon Scattering Phase Space in Anharmonic Semiconductor Crystals [Navaneetha Krishnan Ravichandran](#); Boston College, United States.

NM2.9.10

Spherical and Cylindrical Pores with Amorphous Shells, Impact on the Thermal Transport [Konstantinos Termentzidis](#); CNRS, France.

NM2.9.11

An Ultrathin Heat Pipe Based on Hierarchical Micro/Nanostructures for Electronic Cooling [Ramesh Shrestha](#); Carnegie Mellon University, United States.

NM2.9.12

Size Dependent Thermal Conductivity of Single-Wall Carbon Nanotubes from Molecular Dynamics Simulations [William T. Yorgason](#); Utah State University, United States.

NM2.9.13

Improvement of Thermoelectric Properties through Reduction of Thermal Conductivity by Nanoparticle Addition and Stoichiometric Change to Mg_2Si [William T. Yorgason](#); Utah State University, United States.

NM2.9.14

Assessment of Convective Heat Transfer Behavior of Water Flow in Graphene Nanochannels [Drew Marable](#); University of Tennessee, United States.

NM2.9.15

Role of Structural and Compositional Disorder in Alloys and Glasses on Thermal Conductivity [Jihui Nie](#); Rensselaer Polytechnic Institute, United States.

NM2.9.16

Unprecedented Increase of the Lattice Thermal Conductivity of Auxetic Carbon Crystals under Tensile Strain [Ming Hu](#); RWTH Aachen University, Germany.

NM2.9.17

Trends in Thermal Conductivity for High Aspect Ratio Nanostructures Using Molecular Modeling [Greg Walker](#); Vanderbilt University, United States.

NM2.9.18

Study of Heat Transport in Metal-Coated Carbon Nanotubes Using Molecular Dynamics Atomistic Simulations [Iman Salehinia](#); Northern Illinois University, United States.

NM2.9.19

Particle-Based Device Simulator for Modeling of Self-Heating Effects in P-Type MOSFET Transistors [Dragica Vasileska](#); Arizona State University, United States.

NM2.9.20

Metal-Insulator Metal Metamaterial Thermal Emitter with the Suppression of the Parasitic Modes [Kota Ito](#); Toyota Central R&D Labs Inc, Japan.

NM2.9.21

Degree-of-Freedom Resolved Thermal Transport in the C₆₀ Molecular Crystal [Sushant Kumar](#); Carnegie Mellon University, United States.

NM2.9.22

Nanoscale Thermal Transport in the Kinetic Collective Model [F. Xavier Alvarez](#); Universitat Autònoma de Barcelona, Spain.

NM2.9.23

Enhancement of the Thermophysical Properties of Suspended Silica Thin Films Supporting the Propagation of Surface Phonon-Polaritons [Laurent Tranchant](#); Kyushu Institute of Technology, Japan.

NM2.9.24

Wavevector Dependent Transmission Coefficient at Si/Ge Interfaces and across Vacuum Gaps from First Principles Lattice Dynamics Calculations [Merabia Samy](#); Université de Lyon, CNRS, UCBL, ILM, UMR5306, France.

SESSION NM2.10: Radiative Heat Transport
Session Chair: Giulia Galli
Thursday Morning, April 20, 2017
PCC West, 100 Level, Room 101 BC

8:00 AM *NM2.10.01

Radiative Heat Transfer at the Nanoscale [Pramod Sangi Reddy](#); University of Michigan, United States.

8:30 AM NM2.10.02

Near-Field Thermal Radiation and Gas Conduction in a Nanostructured Gap Measured by Frequency Domain Thermoreflectance (FDTR) [Minyoung Jeong](#); Carnegie Mellon University, United States.

8:45 AM NM2.10.03

Radiation at the Nanoscale—A Heat Transfer Measurement between Parallel Plates [Anthony Fiorino](#); University of Michigan, United States.

9:00 AM NM2.10.04

Perfect Thermal Emission by Nanoscale Transmission Line Resonators [Sheng Shen](#); Carnegie Mellon University, United States.

9:15 AM *NM2.10.05

Near-Field Radiative Heat Transfer—Multiscale Modeling and Measurement between Macroscale Planar Surfaces [Mathieu Francoeur](#); Department of Mechanical Engineering, University of Utah, United States.

9:45 AM BREAK

SESSION NM2.11: Computational Methods
Session Chair: Pramod Reddy
Thursday Morning, April 20, 2017
PCC West, 100 Level, Room 101 BC

10:15 AM *NM2.11.01

First Principles Calculations of Thermal Conductivity with out of Equilibrium Molecular Dynamics Simulations [Giulia Galli](#); University of Chicago, United States.

10:45 AM *NM2.11.02

Modeling Thermal Transport from First-Principles—Nanostructures, Defective Materials, Novel Compounds and Beyond [Natalio Mingo](#); CEA, France.

11:15 AM NM2.11.03

Theory of Substrate-Directed Cross-Plane Heat Dissipation from Two-Dimensional Crystals [Zhun-Yong Ong](#); Institute of High Performance Computing, Singapore.

11:30 AM NM2.11.04

Molecular Dynamics Study of the Influence of Individual Dislocation and Density of Dislocations on the Thermal Conductivity [Konstantinos Termentzidis](#); CNRS, France.

11:45 AM NM2.11.05

Lattice Thermal Conductivity of PbTe-Based Materials Driven Near Ferroelectric Phase Transition [Ivana Savic](#); Tyndall National Institute, Ireland.

SESSION NM2.12: Junctions and Couplings
Session Chair: Jonathan Malen
Thursday Afternoon, April 20, 2017
PCC West, 100 Level, Room 101 BC

1:30 PM *NM2.12.01

Heat Transport through Atomic Contacts [Bernd Gotsmann](#); IBM Research - Zurich, Switzerland.

2:00 PM NM2.12.02

Investigation of a Topography-Free Composite Sample Using a Combined Scanning Thermal Microscopy/Scanning Electron Microscopy Instrument [Severine Gomes](#); CETHIL, UMR 5008, CNRS - INSA Lyon - Université Claude Bernard Lyon 1, France.

2:15 PM NM2.12.03

Heat Transport in Isotopically Engineered Nanowires [Samik Mukherjee](#); Ecole Polytechnique-Montreal, Canada.

2:30 PM NM2.12.04

Correlation of Heat Transport and Shear Forces in Nanoscale Junctions [Benjamin Robinson](#); Lancaster University, United Kingdom.

2:45 PM NM2.12.05

Probing the Mean-Free-Paths of Phonons in Semiconductors and Dielectrics by Fourier-Transform Time-Domain Thermoreflectance (FT-TDTR) [Yee Kan Koh](#); National University of Singapore, Singapore.

3:00 PM BREAK

SESSION NM2.13: Thermal Transport in Organic Materials
Session Chair: Bernd Gotsmann
Thursday Afternoon, April 20, 2017
PCC West, 100 Level, Room 101 BC

3:30 PM *NM2.13.01

Dynamic Disorder Controls Thermal Transport in Superatomic Crystals and Organic-Inorganic Perovskites [Jonathan A. Malen](#); Carnegie Mellon University, United States.

4:00 PM NM2.13.02

C₆₀ Based Molecular Self-Assemblies with On-Demand Thermal and Mechanical Properties [Abduljabar Alsayoud](#); University of Arizona, United States.

4:15 PM NM2.13.03

Thermal Conductivity of Template Fabricated Polymer Nanofibers [Matthew Smith](#); Georgia Institute of Technology, United States.

4:30 PM NM2.13.04

An Integrated Optothermal Sensor for the Measurement of Thermophysical Properties of Bio-Tissues [Xu Xie](#); University of Illinois at Urbana-Champaign, United States.

4:45 PM NM2.13.05

Tuning Thermal Conductivity of Metal-Organic-Frameworks [Alex Greaney](#); University of California, Riverside, United States.

SESSION NM2.14: Poster Session III: Heat Transport at the Nanoscale
Thursday Afternoon, April 20, 2017
8:00 PM - 10:00 PM
Sheraton, Third Level, Phoenix Ballroom

NM2.14.01

Local Thermal Calibration for Quantitative Measurement Using Thermoresistive Micro and Nanoprobes [Eloise Guen](#); CETHIL-UMR5008, CNRS, INSA Lyon, France.

NM2.14.02

Monte Carlo Simulation of Phononic like Silicon Nanostructures—Comparison to Experiments and Models [Maxime Verdier](#); University of Lorraine, LEMTA, France.

NM2.14.03

Ultrafast Interferometric Measurement of Plasmonic Field in a Hot Spot by Thermoreflectance [Stefan Dilhaire](#); University of Bordeaux, France.

NM2.14.04

Real Time Thermal Conductivity Measurement during Growth of Ultrathin Layers [Aitor F. Lopeandia](#); Universitat Autònoma Barcelona, Spain.

NM2.14.05

Probing In-Plane Phonon Mean Free Paths of MoS₂ [Bo Sun](#); California Institute of Technology, United States.

NM2.14.06

Radiative Heat Transfer between Plasmonic Nanospheres [David Becerril](#); Universidad Nacional Autonoma de Mexico, Mexico.

NM2.14.07

2D Ballistic Phonon Heat Conduction from Single Metallic Line Investigated with Electrical Means [Wassim Jaber](#); CETHIL, France.

NM2.14.08

Surface Nanoscale Engineering to Tune Phonon Dispersion and Lifetimes in Low-Dimensional Semiconductors [Sanghamitra Neogi](#); University of Colorado Boulder, United States.

NM2.14.09

Comparison of Monte Carlo Methods for Phonon-Boundary Scattering in Nanoporous Silicon Films [Kevin D. Parrish](#); Carnegie Mellon University, United States.

NM2.14.10

Effect of Anharmonicity on Thermal Conductance at Solid/Solid Interfaces with an Intermediate Layer [Rouzbeh Rastgarkafshgarkolaei](#); University of Virginia, United States.

NM2.14.11

Grain Size Dependent Thermal Conductivity of Twisted Bilayer Graphene by Raman Spectroscopy [Tej B. Limbu](#)^{1,2}; ¹University of Puerto Rico, United States; ²Institute for Functional Nanomaterials, United States.

NM2.14.12

Understanding the Origins of Large Negative Thermal Expansion in Ferroelectric Perovskites from First Principles [Ethan T. Ritz](#); Cornell University, United States.

NM2.14.13

Quantitative Measurements of Intrinsic Thermal Conductivity of Surface and Buried Nanoscale Layers via Cross-Sectional Scanning Thermal Microscopy – X-SThM [Oleg Kolosov](#)^{1,2}; ¹Lancaster University, United Kingdom; ²Lancaster Materials Analysis Ltd, United Kingdom.

NM2.14.14

Roles of Interface and Substrate Properties on Through-Plane Heat Dissipation in 2D-Material-Based Devices [Poya Yasaei](#); University of Illinois at Chicago, United States.

NM2.14.15

Quantifying the Propagator Contribution to Thermal Conductivity in Free-Standing Hydrogenated Amorphous Silicon [Ruiqiang Guo](#); California Institute of Technology, United States.

NM2.14.16

Validity of the Isotropic Thermal Conductivity Assumption in Supercell Lattice Dynamics [Ruiyuan Ma](#); University of Pennsylvania, United States.

NM2.14.17

Viability of HfN Transducers for High Temperature Thermal Measurements Using Time Domain Thermoreflectance [Christina Rost](#); University of Virginia, United States.

NM2.14.18

Understanding Thermal Properties in Entropy-Stabilized Oxides [Jeffrey Braun](#); University of Virginia, United States.

NM2.14.19

Breaking Network Connectivity Leads to Ultralow Thermal Conductivities in Fully Dense Amorphous Solid [Jeffrey Braun](#); University of Virginia, United States.

NM2.14.20

Non-Equilibrium Molecular Dynamics Simulations of Thermal Boundary Conductance in Stacked Two-Dimensional Materials [Klas Karis](#); University of Illinois at Chicago, United States.

NM2.14.21

Characterizing and Controlling the Anisotropic Nanoscale Heat Transfer in 2D van der Waals Materials [Yongjie Hu](#); University of California, Los Angeles (UCLA), United States.

NM2.14.22

Deterministic Simulation of Frequency Dependent Phonon Transport in Nuclear Materials [Jackson Harter](#); Oregon State University, United States.

NM2.14.23

Light-Induced Temperature Control in Solid-State Nanopores [Meni Wanunu](#); Northeastern University, United States.

NM2.14.24

Synthesis and Thermal Analysis of Vertically Aligned CNTs Grown on Copper Substrates [QiuHong Zhang](#); University of Dayton, United States.

NM2.14.25

Novel Scanning Thermal Microprobe for Co-Registered Seebeck Coefficient and Thermal Conductivity [Nicholas Kempf](#); Boise State University, United States.

NM2.14.26

Epitaxial Metal-Semiconductor Interfacial Thermal Conductance [Ning Ye](#); University of Delaware, United States.

NM2.14.27

Characterization of Thermal Transport in Amorphous Germanium [Freddy DeAngelis](#); Georgia Institute of Technology, United States.

NM2.14.28

Temperature Dependent Thermal Conductivity of Aluminum Rich AlGaN Alloys [Christopher B. Saltonstall](#); Sandia National Laboratories, United States.

NM2.14.29

Heat Conduction Analysis Involving the Effect Arising from Phonon Coherence [Takuma Shiga](#); The University of Tokyo, Japan.

NM2.14.30

How are Phonons Scattered at the Interface between Inorganic Nanoparticles and Polymers? [Christian Huebner](#); University of Duisburg-Essen, Germany.

NM2.14.31

Controlling Thermal Transport in Porous Nanocomposite for Thermoelectric Applications [Yue Wu](#); Iowa State University, United States.

NM2.14.32

A Detailed Wave-Packet Study of Phonon Scattering at Surfaces—Effect of Roughness and Morphology [Cheng Shao](#); Shanghai Jiao Tong University, China.

NM2.14.33

Anharmonic Lattice Dynamics Prediction of Thermal Conductivity of 2D Materials—A Discussion on the Accuracy [Hua Bao](#); Shanghai Jiao Tong University, China.

- NM2.14.34**
Thermal Properties of Half Heusler Superlattices [Emigdio Chavez-Angel](#)^{1,2}; ¹Johannes Gutenberg-Universität Mainz, Germany; ²Catalan Institute of Nanoscience and Nanotechnology, Spain.
- NM2.14.35**
The Effect of Nanotube Length and Temperature on Phonon Transport and Thermal Conductivity of Graphyne Nanotubes [Ali Ramazani](#); University of Michigan, United States.
- NM2.14.36**
Parallel Measurement of Conductive and Convective Thermal Transport of Micro/Nanowires Based on Raman Mapping [Yanan Yue](#); Wuhan University, China.
- NM2.14.37**
Molecular Dynamics Study on Thermal Transport at Carbon Nanotube Interface Junctions—Effects of Mechanical Force and Chemical Functionalization [Yanan Yue](#); Wuhan University, China.
- NM2.14.38**
Carbonized Electrospun Nanofiber Sheets for Thermophones [Ali Aliev](#); University of Texas at Dallas, United States.
- NM2.14.39**
Interatomic Potentials for Mechanical Properties via Machine Learning [Andrew D. Rohskopf](#); Georgia Institute of Technology, United States.
- NM2.14.40**
Study of Radiative Heat Transfer in Ångström and Nanometer Sized Gaps [Longji Cui](#); University of Michigan, United States.
- NM2.14.41**
Analysis of the Temperature Dependence of the Thermal Conductivity in Single Crystal Oxides [Eric Langenberg](#); Centro de Investigación en Química Biológica e Materiais Moleculares (Universidade de Santiago de Compostela), Spain.
- NM2.14.42**
Impedance Matching for Phonons at Solid-Solid Interfaces [Jingjie Zhang](#); University of Virginia, United States.
- NM2.14.43**
Synthesis of Fe_xCo_{1-x}S₂ Nanoparticles Using Hot-Injection Method for Use in Thermoelectric Applications [Rick Eyi](#); University of Arkansas, United States.
- NM2.14.44**
Thermal Conductivity of Oxide-Based Thin Films Measured by Frequency Domain Thermoreflectance (FDTR) [Alexandros Sarantopoulos](#); Universidad de Santiago de Compostela, Spain.
- NM2.14.45**
Magnetic Polariton Enhanced Localized Heating for Heat Assisted Magnetic Recording Applications [Xiaoyan Ying](#); Arizona State University, United States.
- NM2.14.46**
Thin Silica Micro-Grating Coating for Enhancing Radiative Cooling of Solar Cells [Linshuang Long](#)^{1,2}; ¹Arizona State University, United States; ²University of Science and Technology of China, China.
- NM2.14.47**
Plasmonic Light Trapping for Enhanced Infrared Photon Absorption in Ultrathin Wide-Bandgap Semiconductors [Qing Ni](#)^{2,1}; ¹University of Science and Technology of China, China; ²Arizona State University, United States.
- NM2.14.48**
Non-Diffusive Thermal Transport in Silicon at Low Temperatures [Vinay S. Chauhan](#); The Ohio State University, United States.
- NM2.14.49**
Heat Pulse Propagation in Silicon Phononic Crystals [Weixuan Li](#); University of Florida, United States.
- NM2.14.50**
Dynamical Thermal Conductivity in Single-Crystalline Graphene Ribbons [Arnab K. Majee](#); University of Massachusetts Amherst, United States.
- NM2.14.51**
Phonon Transport Dynamics in SiGe Alloy Nanowires and Nanocomposites [Meenakshi Upadhyaya](#); University of Massachusetts Amherst, United States.
- NM2.14.52**
Enhanced Thermal Conductivity and Low Permittivity of Resin Based Composites Modified by Mesoporous-SiO₂ and Mesoporous-SiO₂@Al₂O₃ Microspheres [Jun Zhou](#); Xi'an Jiaotong University, China.
- NM2.14.53**
Heat Transfer in Porous Crystals Containing Adsorbed Gases [Hasan Babaei](#)^{1,2}; ¹University of Pittsburgh, United States; ²Carnegie Mellon University, United States.
- SESSION NM2.15: Thermal Measurement Techniques
 Session Chair: Ravi Prasher
 Friday Morning, April 21, 2017
 PCC West, 100 Level, Room 101 BC
- 8:00 AM *NM2.15.01**
Mode-Resolved Phonon Scattering Rates across the Brillouin Zone with Neutron and X-Ray Scattering [Olivier Delaire](#)^{1,2}; ¹Duke University, United States; ²Oak Ridge National Laboratory, United States.
- 8:30 AM NM2.15.02**
Individual Upconverting Nanoparticles as Nanoscale Heaters and Thermometers [Andrea Pickel](#); University of California, Berkeley, United States.
- 8:45 AM NM2.15.03**
Scanning Thermal InfraRed Microscopy (STIRM) a New Method for Measuring Thermal Conductivity and Chemical Composition at the Nanoscale [Andrea Centrone](#); National Institute of Standard and Technology, United States.
- 9:00 AM NM2.15.04**
Calibrated Scanning Thermal Microscopy for Nanolayered and Micropatterned Samples [Pierre-Olivier Chapuis](#); CNRS - INSA Lyon, France.
- 9:15 AM NM2.15.05**
Full-Field Thermal Imaging of Submicron Heat Transport in InGaAs and Silicon [Amir K. Ziabari](#); Purdue University, United States.
- 9:30 AM NM2.15.06**
Developing Superior Alloy Contacts Optimized for Electrical and Thermal Transport at Metal-Graphene Interfaces [Dipanjan Saha](#); Carnegie Mellon University, United States.
- 9:45 AM BREAK**
- SESSION NM2.16: Interfacial Thermal Transport
 Session Chair: Olivier Delaire
 Friday Morning, April 21, 2017
 PCC West, 100 Level, Room 101 BC
- 10:15 AM *NM2.16.01**
Manipulating Interfacial Thermal Transport Using Surface Chemistry [Ravi Prasher](#); Lawrence Berkeley National Laboratory, United States.
- 10:45 AM NM2.16.02**
Cooperative Molecular Behavior Enhances the Thermal Conductance of Binary Self-Assembled Monolayer Junctions [Alan McGaughey](#); Carnegie Mellon University, United States.

11:00 AM NM2.16.03

Thermal Phonon Diffraction from Atomically Rough Surfaces [Navaneetha Krishnan Ravichandran](#)^{2,1}; ¹Boston College, United States; ²California Institute of Technology, United States.

11:15 AM NM2.16.04

Thermal Boundary Resistance-Limited Performance of High-Frequency Photodiodes—Towards *In Situ* Thermoreflectance Measurements without Metal Transducers [Patrick E. Hopkins](#); University of Virginia, United States.

11:30 AM NM2.16.05

A Numerical Test of the Diffuse Mismatch Model—Wavevector-Resolved Modeling of Phonon Transmission across Rough Interfaces [Rohit R. Kakodkar](#); University of Delaware, United States.

11:45 AM NM2.16.06

Fabrication and Characterization of Copper Nanowire Arrays as Thermal Interface Materials [Wei Gong](#); Carnegie Mellon University, United States.

SESSION NM2.17: Radiative Thermal Devices and Key Parameters

Session Chair: Alan McGaughey
Friday Afternoon, April 21, 2017
PCC West, 100 Level, Room 101 BC

1:30 PM *NM2.17.01

Contactless Thermotronics with Photons [Philippe Ben-Abdallah](#)^{2,3}; ²Laboratoire Charles Fabry CNRS/ Institut d'Optique, France; ³Université de Sherbrooke, Canada.

2:00 PM NM2.17.02

Multi-Length Scale Coupled Phonon-Electron Monte Carlo Simulations of Three-Dimensional GaN Transistors [Hongbo Zhao](#); University of Arizona, United States.

2:15 PM NM2.17.03

Toward Radiative Thermal Information Processing—Multilevel Memory and Near-Field Effect [Kota Ito](#); Toyota Central R&D Labs Inc, Japan.

2:30 PM NM2.17.04

Near-Field Thermophotovoltaic Energy Conversion by Excitation of Magnetic Polaritons inside Nanometer Vacuum Gaps with Nanostructured Drude Emitters [Payam Sabbaghi](#); Arizona State University, United States.

2:45 PM NM2.17.05

A Full Drift-Diffusion Model for Near-Field Radiation Mediated Thermophotovoltaic Devices [Rodolphe Vaillon](#)^{1,2}; ¹Univ Lyon, CNRS, INSA-Lyon, Université Claude Bernard Lyon 1, CETHIL UMR5008, France; ²University of Utah, United States.

3:00 PM NM2.17.06

Characterizing Electron Phonon Coupling in Elemental Metals with Picosecond Electrical Pulses [Richard B. Wilson](#); University of California, Riverside, United States.