

NFO School

Sunday September 4, 2016

11:00-12:30 **Su-1: Tutorial Lecture 1 (Chair: Atsushi Sugita)**

Near-Field Coupling in Plasmonic Systems

Shinji Hayashi, *Kobe University, Japan & Moroccan Foundation of Advanced Science, Innovation and Research (MAScIR), Morocco*

In a variety of physical systems, interaction or coupling between excitations generates new phenomena not achieved by a single excitation. In plasmonic systems, coupling of plasmonic excitations mediated by near fields plays crucial roles to produce new plasmonic phenomena which may find potential applications such as biosensors, waveguides and light emitters. In this lecture, starting from a discussion on coupled harmonic oscillators, various aspects of near-field coupling in plasmonic and related systems are discussed. The focus will be put on strong coupling between surface plasmons and excitons, Fano resonance and plasmon-induced transparency.

12:30-13:30 **Lunch**

13:30-15:00 **Su-2: Tutorial Lecture 2 (Chair: Yasushi Inouye)**

Controlling Spontaneous Emission with Nanoantennas

Jean-Jacques Greffet, *Laboratoire Charles Fabry, Institut d'Optique, France*

Spontaneous emission of an emitter can be tailored by modifying its environment. We will start by introducing the basic concepts that are used to analyze light emission classically and in a quantum framework. This will be useful to identify what is quantum and what is classical. We will then discuss a few challenges in the field: Is it possible to achieve a spontaneous emission rate enhancement larger than 1000 ? Is it possible to prevent quenching ? Is it possible to achieve a 100% efficiency single photon emitter ? We will review recent progress and discuss application to fluorescence enhancement, single photon emission and thermal radiation.

15:00-15:30 **Coffee Break**

15:30-17:00 **Su-3: Tutorial Lecture 3 (Chair: Yasushi Inouye)**

Nonlinear Plasmonics

Olivier J. F. Martin, *Swiss Federal Institute of Technology Lausanne, Switzerland*

Nonlinear optics is a fascinating topic of modern optics, which has been made possible by the developments of ultrafast lasers. Nonlinear optical phenomena usually resort to specific bulk crystals with a strong nonlinear susceptibility. In this lecture, I will explore another way of realizing nonlinear optical effects, using plasmonic nanostructures. Such nanostructures do not exhibit a strong bulk nonlinear susceptibility; yet, they can be used to produce nonlinear effects, such as second harmonics that originate from the surface of the metal. The different mechanisms that lead to nonlinear effects in plasmonic nanostructures will be described and I will show how they can be enhanced by the strong near-field produced by plasmonic nanostructures and how the symmetry and the modes of the system control these nonlinear effects.

18:30-20:00 **Welcome Reception (Room P, 3rd Floor in Congress Center)**

20:00-21:30 **Su-4: Tutorial Lecture 4 (Chair: Atsushi Sugita)**

Ultrafast Nano-imaging: Probing Matter on Its Natural Time and Length Scales

Markus B. Raschke, *University of Colorado and JILA, USA*

The properties of many functional molecular and quantum materials rely on structure, coupling, and dynamics of the interactions of its constituents defined on both atomic-nanometer length and ultrafast atto- to femtosecond time scales. The spatio-temporal access to the underlying interactions such as the spin, lattice, and electronic degrees of freedom has remained one of the long standing dreams in spectroscopy and imaging.

In this lecture we will cover the basic principles of the emergent techniques of ultrafast nano-imaging. We will start with a review of the fundamentals of near-field localization and light-matter interaction with a special emphasis on its time domain description. We will then discuss specific coherent and nonlinear electronic, Raman, and IR/THz, and pump-probe spectroscopies, and how these modalities can be implemented in a near-field imaging setting. I will provide a hands on guide on specific laser and near-field scanning probe requirements, implementations, and measurement schemes. We will conclude with a broader perspective into the multimodal regime harnessing the combined power of electron and photon wave packet interaction to reach the ultimate limit of imaging quantum dynamics of single emitter in interacting environments, e.g., in biology, catalysis, or energy materials. .

Conference Program

Monday September 5, 2016

08:30-08:50 **Opening Remarks (Concert Hall)**

Session Mo-1: Keynote (Chair: Yoshimasa Kawata)

08:50-09:20 **Mo-1-1: Keynote 1 (Concert Hall)**

Realized and Un-realized Visions in NFO, Plasmonics and Optical Antennas

Dieter W. Pohl, *IBM Research Laboratory Zurich and Basel University (retired), Switzerland*

09:20-10:00 **Mo-1-2: Keynote 2 (Concert Hall)**

Tip-enhanced Raman Microscopy: Near Field Optics for Molecular Imaging in Nano

Satoshi Kawata, *Osaka University, Japan*

10:00-10:15 **Group Photo (Concert Hall)**

10:15-10:45 **Coffee Break (Room P)**

Session Mo-2A: Tip-enhanced Raman (Chair: Yasushi Inouye)

10:45-11:15 **Mo-2A-1: Invite**

Tip-enhanced Raman Spectroscopy at Electrochemical Interfaces

N. Martín Sabanés, L. Driessen, and K. F. Domke,
Max Planck Institute for Polymer Research, Germany

11:15-11:30 **Mo-2A-2**

Cryogenic Tip-enhanced Raman Spectroscopy and Tip-enhanced Photoluminescence Imaging for Investigation of Single-molecule Dynamics and Two-Dimensional Materials

Kyoung-Duck Park¹, Eric A. Muller¹, Vasily Kravtsov¹, Omar Khatib¹, Genevieve Clark², Xiaodong Xu², and Markus B. Raschke¹, *¹Department of Physics, Department of Chemistry, and JILA, University of Colorado, USA, ²Department of Physics, Department of Materials Science and Engineering, University of Washington, USA*

11:30-11:45 **Mo-2A-3**

Atomistic Treatment of Tip-enhanced Raman Spectroscopy for Visualization and Interpretation of Single Molecule Chemical Maps

Yao Zhang^{1,2}, Rui Zhang², Zhen Chao Dong², and Javier Aizpurua¹
¹Material Physics Center CSIC-UPV/EHU and Donostia International Physics Center (DIPC), Spain, ²Hefei National Laboratory for Physical Sciences at the Microscale, University of Science and Technology of China, China

11:45-12:00 **Mo-2A-4**

Nanoscale Raman of 2D Materials: from Graphene to TMDChs

A. Krayev¹, M. Chaigneau², D. Evplov¹, V. Gavriluk¹, and V. Zhizhimontov¹
¹AIST-NT Inc., USA, ²Horiba Scientific, France

12:00-12:15 **Mo-2A-5**

Electroless Deposition of Nanogold at the Silicon AFM Tip Apex for Tip-enhanced Raman Spectroscopy

H. Itasaka¹, M. Nishi¹, M. Shimizu¹, Y. Okuno², N. Naka², and K. Hirao¹
¹Kyoto University, Japan, ²HORIBA, Ltd., Japan

Session Mo-2B: Light Matter Interactions (Chair: Christiane Hoppener)

10:45-11:15 **Mo-2B-1: Invite**

Extreme Near-field Coupling in Vertical Plasmonic Nanocavity for Sensing Applications

Weihua Zhang
College of Engineering and Applied Sciences, Nanjing University, China

11:15-11:30 **Mo-2B-2**

Interaction between Chiral Emitters and Optical Resonators

S. J. Yoo, and Q. H. Park, *Department of Physics, Korea University, South Korea*

11:30-11:45 **Mo-2B-3**

Photonic Antennas to Manipulate the Emission of Magnetic Dipole Transitions

M. Mivelle¹, T. Grosjean², U. Fischer³, G. Burr⁴, and M. F. Garcia-Parajo^{1,5}
¹ICFO-Institut de Ciències Fotoniques, The Barcelona Institute of Science and Technology, Spain, ²Department of Optics, FEMTO-ST Institute, UMR CNRS 6174, University of Franche-Comte, France, ³Interface Physics Group, Physics Institute, University of Münster, Germany, ⁴IBM Almaden Research Center, USA, ⁵ICREA – Institutio Catalana de Recerca i Estudis Avancats, Spain

11:45-12:00 **Mo-2B-4**

Enhanced PL-emission from an Optically Pumped Bias Driven Tunneling Junction

K. Braun, X. Wang, A. M. Kern, H. Adler, H. Peisert, T. Chassé, D. Zhang, and A. J. Meixner, *Institute of Physical and Theoretical Chemistry and LISA+, University of Tuebingen, Germany*

12:00-12:15 **Mo-2B-5**

Photon Spin and the Electromagnetic Origin of Electron Charge

U. C. Fischer, *Physikalisches Institut, University of Muenster, Germany*

12:15-13:30 **Lunch & Luncheon Seminar (HORIBA Scientific)**

Session Mo-3A: Nanoantenna (Chair: Junichi Takahara)

13:30-14:00 **Mo-3A-1: Invite**

Near-field Mapping of Chiral Metasurfaces and Spiral Antennas

M. Schnell^{1,2}, P. Sarriguren¹, T. Neuman³, A. B. Khanikaev⁴, G. Shvets⁵, J. Aizpurua³, R. Hillenbrand^{6,7}

¹CIC nanoGUNE Consolider, Spain, ²Beckman Institute for Advanced Science and Technology, U of I UC, USA, ³Materials Physics Center CSIC-UPV/EHU and DIPIC, Spain, ⁴Department of Physics, Queens College of the City Univ. of New York, USA, ⁵Depart. of Physics, The Univ. of Texas at Austin, USA, ⁶CIC NanoGUNE Consolider and EHU/UPV, Spain, ⁷IKERBASQUE, Basque Foundation for Science, Spain

14:00-14:15 **Mo-3A-2**

Elucidating Magnetic and Electric Near-field Mapping by Phase-locked Polarization-resolved Coherent Detection

G. Calbris¹, M. Mivelle^{1,2}, M. F. Garcia-Parajo^{2,3} and N. F. van Hulst^{2,3}

¹ICFO, Spain, ²INSP, Université Pierre et Marie Curie, France, ³ICREA, Institució Catalana de Recerca i Estudis Avançats, Spain

14:15-14:30 **Mo-3A-3**

Beyond Dipolar Regime for High-order Plasmon Mode Bowtie Antenna

A. Cuche¹, S. Viarbitskaya^{1,2}, U. Kumar¹, J. Sharma^{1,3}, A. Arbouet¹, C. Girard¹, and E. Dujardin¹, ¹CEMES, University of Toulouse and CNRS, France, ²ICB, University of Bourgogne and CNRS, France, ³CNSNT, Panjab University, India

14:30-14:45 **Mo-3A-4**

Steering Unidirectional Emission from Nanoantenna Array Metasurfaces

K. Lindfors^{1,2,3}, D. Dregely^{1,2}, M. Lippitz^{1,2,4}, N. Engheta⁵, M. Totzeck⁶, and H. Giessen¹,

¹Fourth Physics Institute and Research Center SCoPE, University of Stuttgart, Germany, ²Max Planck Institute for Solid State Research, Germany, ³Department of Chemistry, University of Cologne, Germany, ⁴Department of Physics, University of Bayreuth, Germany, ⁵Department of Electrical and Systems Engineering, University of Pennsylvania, USA, ⁶Corporate Research and Technology, Carl Zeiss AG, Germany

14:45-15:00 **Mo-3A-5**

Extraordinary Bidirectional Scattering of Visible Light Enabled by All-dielectric Nanoantenna

Jiaqi Li^{1,2}, Niels Verellen^{1,2}, Dries Vercauteren², Twan Bearda², Liesbet Lagae^{1,2}, and Pol Van Dorpe^{1,2},

¹Department of Physics and Astronomy, KULeuven, Belgium, ²IMEC, Belgium

15:00-15:15 **Mo-3A-6**

Spontaneous Emission Enhancement of a Single Quantum Dot by Two Orders of Magnitude using a Gold Nanocone Antenna

K. Matsuzaki¹, H.-W. Liu¹, B. Hoffmann¹, A. Dutschke^{1,2}, S. Christiansen^{1,3}, S. Götzinger^{1,4}, and V. Sandoghdar^{1,4}, ¹Max Planck Inst. for the Science of Light, Germany, ²Carl Zeiss Microscopy GmbH, Germany, ³Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany, ⁴Friedrich Alexander Univ. of Erlangen-Nürnberg, Germany

15:15-15:30 **Mo-3A-7**

Spin-controlled Near-field Addressing of Plasmonic Nano-antennas

Y. Lefier¹, M. Suarez¹, R. Salut¹, U. Fischer² and T. Grosjean¹,

¹Femto-ST Institute, Besançon, France, ²Interface physics group, WWU, Germany

Session Mo-3B: Electron-plasmon Interactions (Chair: Jean-Jacques Greffet)

13:30-14:00 **Mo-3B-1: Invite**

Mapping 3D Particle Plasmon Fields using Electron Microscopy

Ulrich Hohenester, Institute of Physics, University of Graz, Austria

14:00-14:15 **Mo-3B-2**

Electron Energy-loss Study of Plasmonic Heterostructures

V. Flauraud¹, G.D. Bernasconi², J. Butet², D. T. L. Alexander³, O. J. F. Martin², J. Brugger¹,

¹Microsystems Laboratory*, ²Nanophotonics and Metrology Laboratory*

³Interdisciplinary Center for Electron Microscopy*, *Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland

14:15-14:30 **Mo-3B-3**

Characterization of the Optical Properties of Gold Nanostructures with Various Geometries by STEM/Cathodoluminescence and EELS Measurements

T. Maurer¹, N.-B. Bercu², A. Gontier^{1,2}, J. Michel², P.-M. Adam¹, M. Molinari²

¹Laboratoire de Nanotechnologie et d'Instrumentation Optique, ICD CNRS UMR STMR 6281, Université de Technologie de Troyes, France, ²Laboratory of Research in Nanosciences LRN EA4682, University of Reims Champagne Ardenne, France

14:30-14:45 **Mo-3B-4**

Electron Energy-loss Spectroscopy Calculation in Finite-difference Time-domain: EELS-FDTD

N. Large¹, A. Manjavacas², E. Ringe³, G. C. Schatz⁴, S. W. Wang⁵, and P. Nordlander³

¹Physics & Astronomy Department, University of Texas San Antonio, USA, ²Department of Physics, University of New Mexico, USA, ³Department of Materials Science & NanoEngineering, Rice University, USA, ⁴Department of Chemistry, Northwestern Univ., USA, ⁵Department of Materials Science & Engineering, Stanford University, USA

14:45-15:00 **Mo-3B-5**
Unveiling the Loss Mechanisms in Electron Energy-loss Spectroscopy
J. Butet¹, G. D. Bernasconi¹, V. Flauraud², D. T. L. Alexander³, J. Brugger², O. J. F. Martin¹, ¹Nanophotonics and Metrology Laboratory (NAM)*, ²Microsystems Laboratory*, ³Interdisciplinary Center for Electron Microscopy (CIME)*, *Swiss Federal Institute of Technology Lausanne (EPFL), 1015 Lausanne, Switzerland.

15:00-15:15 **Mo-3B-6**
Symmetric and Anti-symmetric Coupling of Plasmonic Nanopores
T. Sannomiya¹, H. Saito², J. Junesch³, and N. Yamamoto¹, ¹Tokyo Institute of Technology, Japan, ²Kyushu University, Japan, ³Chalmers Univ. of Technology, Sweden

15:15-15:30 **Mo-3B-7**
Cathodoluminescence Nanoscopy of Plasmonic Nanostructures
R. Verre¹, T. J. Antosiewicz^{1,2}, and M. Käll¹, ¹Bionanophotonic Division, Physics Dept, Chalmers Univ. of Tech., Sweden, ²Centre of New Technologies, Univ. of Warsaw, Poland

15:30-16:00 **Coffee Break**

Session Mo-4A: Nano-imaging (Chair: Rainer Hillenbrand)

16:00-16:30 **Mo-4A-1: Invite**
Recent Progress in Semiconductor Nanowire Photodetectors for Multispectral Imaging
Kenneth B. Crozier
School of Physics, University of Melbourne, Australia and Department of Electrical and Electronic Engineering, University of Melbourne, Australia

16:30-16:45 **Mo-4A-2**
Near-field Imaging of Single Carbon Nanotubes in the Telecom Wavelength Range
F. Intonti¹, F. La China¹, N. Caselli¹, F. Sarti¹, F. Biccari¹, U. Torrini¹, A. Vinattieri¹, E. Durán-Valdeiglesias², C. Alonso-Ramos², A. Filoramo³, L. Vivien², and M. Gurioli¹
¹LENS and Department of Physics, University of Florence, Italy, ²Inst. Elect. Fondamentale (IEF), Univ Paris Sud, France, ³CEA Saclay, IRAMIS, France

16:45-17:00 **Mo-4A-3**
Plasmon Nano-focusing for White Nano-light Source
Misaki Tanaka¹, Takayuki Umakoshi² and Prabhat Verma¹, ¹Department of Applied Physics, Osaka University, Japan, ²Kanazawa University, Japan

17:00-17:15 **Mo-4A-4**
Circular Dichroism Microscopy Free from Commingling Linear Dichroism to Analyze Chiroptical Properties of Materials
T. Narushima^{1,2} and H. Okamoto¹,
¹Institute for Molecular Science and The Graduate University for Advanced Studies, Japan, ²PRESTO, Japan Science and Technology Agency, Japan

17:15-17:30 **Mo-4A-5**
Imaging of Phase Change Materials below a Capping Layer using Correlative Infrared Near-field Microscopy and Electron Microscopy
M. Lewin¹, B. Hauer¹, M. Bornhöfft^{2,3}, L. Jung¹, A.-K. U. Michel¹, J. Mayer^{2,3}, M. Wuttig¹, and T. Taubner¹, ¹Institute of Physics (IA), RWTH Aachen University, Germany, ²Ernst Ruska-Centre and JARA - Fundamentals of Future Information Technologies, Forschungszentrum Jülich GmbH, Germany, ³Gemeinschaftslabor für Elektronenmikroskopie, RWTH Aachen University, Germany

17:30-17:45 **Mo-4A-6**
Vibrational Contrast Imaging and Nanospectroscopy of Single Cell Membranes by Tip-enhanced Absorption in the Mid-IR
V. Giliberti^{1,2}, M. Badioli¹, L. Baldassarre¹, A. Nucara¹, P. Calvani¹, E. Ritter³, P. Hegemann³, U. Schade⁴, M. Ortolani¹,
¹Department of Physics, Sapienza University of Rome, Italy, ²Istituto Italiano di Tecnologia, Centre for Life Nano Science, Italy, ³Humboldt-Universität zu Berlin, Institut für Biologie, Germany, ⁴Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

17:45-18:00 **Mo-4A-7**
Nanoscale Spatial Profiling of Exciton Complexes in Monolayer Semiconductors
Jeongyong Kim, Center for Integrated Nanostructure Physics, Institute for Basic Science, Sungkyunkwan University, South Korea and Department of Energy Science, Sungkyunkwan University, South Korea

Session Mo-4B: Infrared Optics (Chair: Kiyoshi Kobayashi)

16:00-16:30 **Mo-4B-1: Invite**
Switchable Infrared Nanophotonic Elements Enabled by Phase-change Materials
P. Li, X. Yang, T. W.W. Mass, J. Hanss, M. Lewin, A.-K. U. Michel, D.N. Chigrin, M. Wuttig and T. Taubner, Institute of Physics (IA), RWTH Aachen University, Germany

16:30-16:45 **Mo-4B-2**
Control of Surface Phonon Polariton Confinement with Phase Change Material for Tunable Surface Enhanced Infrared Spectroscopy
M. Nakamura¹, S. Kanazawa¹, M. Kuwahara² and T. Saiki¹

¹Graduate School of Science and Technology, Keio University, Japan,

²Electronics and Photonics Research Institute, AIST, Japan

16:45-17:00 **Mo-4B-3**

Scanning Probe Tips Made of Epitaxial Germanium with Plasma Frequency in the Mid Infrared

Emilie Sakat^{1,7}, Valeria Giliberti^{2,3}, Leonetta Baldassarre^{2,3}, Monica Bollani^{4,5}, M. Virginia P. Altoe⁶, Mauro Melli⁶, Alexander Weber-Bargioni⁶, Andrea Notargiacomo⁴, Marialilia Pea⁴, Michele Celebrano¹, Marco Finazzi¹, Jacopo Frigerio^{1,5}, Giovanni Isella^{1,5}, Jean-Paul Hugonin⁷, Paolo Biagioni¹, Stefano Cabrini⁶, Michele Ortolani²,

¹Dipartimento di Fisica, Politecnico di Milano, Italy, ²Dipartimento di Fisica, Sapienza Università di Roma, Italy, ³Center for Life Nano Sciences, Istituto Italiano di Tecnologia, Italy, ⁴Istituto di Fotonica e Nanotecnologie (IFN-CNR), Italy, ⁵L-NESS, Dipartimento di Fisica del Politecnico di Milano, Italy, ⁶Molecular Foundry, Lawrence Berkeley National Laboratory, USA, ⁷Laboratoire Charles Fabry, Institut d'Optique, France

17:00-17:15 **Mo-4B-4**

Hole Array Plasmonic Perfect Absorbers for Selective Mid-Wavelength Infrared Pyroelectric Detectors

T. D. Dao^{1,2}, S. Ishii^{1,2}, T. Yokoyama^{1,2}, T. Sawada^{1,2}, R. P. Sugavaneshwar^{1,2}, K. Chen^{1,2}, Y. Wada¹, T. Nabatame^{1,2}, and T. Nagao^{1,2,3}, ¹International Center for Materials Nanoarchitectonics, National Institute for Materials Science (NIMS), Japan, ²CREST, Japan Science and Technology Agency, Japan, ³Department of Condensed Matter Physics, Graduate School of Science, Hokkaido University, Japan

17:15-17:30 **Mo-4B-5**

Time-resolved Nanoscopy with NIR to Deep THz Radiation

F. Kuschewski¹, S.C. Kehr¹, H.-G. v. Ribbeck¹, J. Döring¹, S. Winnerl², N. Awari³, B. Green³, S. Kovalev³, M. Gensch³, and L.M. Eng¹,

¹Institut für Angewandte Physik, TU Dresden, Germany, ²Helmholtz-Zentrum Dresden-Rossendorf, Institut für Ionenstrahlphysik und Materialforschung, Germany, ³Helmholtz-Zentrum Dresden-Rossendorf, Institut für Strahlenphysik, Germany

17:30-17:45 **Mo-4B-6**

Near-field Enhancement and Optimal Performance in Metamaterial Terahertz Modulators Based on 2D-materials

S. Arezoomandan¹, R. Yan³, P. Gopalan¹, K. Tian², A. Chanana¹, A. Tiwari², H. G. Xing³, A. Nahata¹, and B. Sensale-Rodriguez¹, ¹Department of Electrical and Computer Engineering, The Univ. of Utah, USA, ²Department of Materials Science and Engineering, The Univ. of Utah, USA, ³School of Electrical and Computer Engineering and Department of Materials Science and Engineering, Cornell University, USA

17:45-18:00 **Mo-4B-7**

Efficient Sunlight-to-heat Transfer by Resonant Nanoparticles

S. Ishii, K. Chen, R. P. Sugavaneshwar, T. D. Dao, and T. Nagao, International Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), Japan and CREST, Japan Science and Technology Agency, Japan

Tuesday September 6, 2016

Session Tu-1: Keynote (Chair: Din Ping Tsai)

08:30-09:10 **Tu-5-1: Keynote 3 (Room A)**

Nanooptics in Strong Ultrafast Fields

Mark I. Stockman, Center for Nano-Optics (CeNO) and Department of Physics and Astronomy, Georgia State University, USA

Session Tu-5A: Terahertz & IR (Chair: Din Ping Tsai)

09:15-09:30 **Tu-5A-2**

Temperature Effects on Surface Plasmon Enhanced Smith-Purcell Terahertz Radiation for Semiconductor-based Grating

Bo Han Cheng¹, Yu-Siou Ye², Yung-Chiang Lan², and Din Ping Tsai^{3,4}

¹Department of Electro-Optical Engineering, National Taipei University of Technology, Taiwan, ²Department of Photonics and Advanced Optoelectronic Technology Center, National Cheng Kung University, Taiwan, ³Research Center for Applied Sciences, Academia Sinica, Taiwan, ⁴Department of Physics, National Taiwan University, Taiwan

09:30-09:45 **Tu-5A-3**

Terahertz Time-domain Spectroscopy of Tunneling Currents through Angstrom-sized Gaps

Joon-Yeon Kim¹, Bong Joo Kang², Young-Mi Bahk¹, Yong Seung Kim³, Joohyun Park⁴, Won Tae Kim², Jiyeah Rhie¹, Sanghoon Han¹, Hyeongtag Jeon^{4,5}, Cheol-Hwan Park⁶, Fabian Rotermund², and Dai-Sik Kim¹,

¹Department of Physics and Astronomy and Center for Atom Scale Electromagnetism, Seoul National University, South Korea, ²Department of Physics and Department of Energy Systems Research, Ajou University, South Korea, ³Graphene Research Institute and Department of Physics, Sejong University, South Korea, ⁴Department of Nanoscale Semiconductor Engineering and ⁵Division of Materials Science and Engineering, Hanyang University, South Korea, ⁶Department of Physics and Astronomy and Center for Theoretical Physics, Seoul National University, South Korea

09:45-10:00 **Tu-5A-4**

Mid-IR Molecular Sensing with Germanium Antennas on Silicon

L. Baldassarre¹, E. Sakat², M. Bollani³, A. Samarelli⁵, K. Gallacher⁵, J. Frigerio^{2,4}, G. Pellegrini², V. Giliberti⁵, M. P. Fischer⁷, D. Brida⁷, G. Isella^{2,4}, D. J. Paul⁵, M. Ortolani¹, and P. Biagioni², ¹Department of Physics, Sapienza University of Rome, Italy, ²Dipartimento di Fisica, Politecnico di Milano, Italy, ³IFN-CNR, via Anzani 42, Italy, ⁴L-NESS, Dipartimento di Fisica del Politecnico di Milano, Italy, ⁵School of Engineering, Univ. of Glasgow, UK, ⁶Center for Life Nanosciences, Istituto Italiano di Tecnologia, Italy, ⁷Department of Physics and Center for Applied Photonics, Univ. of Konstanz, Germany

Session Tu-5B: Nano Thermal (Chair: Markus Raschke)

09:15-09:30 **Tu-5B-2**

Promoted Sulfurization of Ag Nanoparticle due to Plasmon Resonance by White Light Illumination

Y. Ikeda¹, M. Miyata¹, and J. Takahara^{1,2}, ¹Graduate School of Engineering, Osaka University, Japan, ²Photonic Advanced Research Center, Japan

09:30-09:45 **Tu-5B-3**

Probing the Thermal Activity of Plasmonic Antennas by Monitoring the Electron Transport in a Nanowire

M. M. Mennemanteuil¹, M. Buret¹, N. Cazier¹, M. Besbes², Ph. Ben-Abdallah², G. Colas-des-Francis¹ and A. Bouhelier¹, ¹Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303 CNRS, Université Bourgogne Franche-Comté, France, ²Laboratoire Charles Fabry, Institut d'Optique Graduate School, CNRS, Université Paris-Saclay, France

09:45-10:00 **Tu-5B-4**

Experimental Study on Electromagnetic Heat Transfer: Near-field Coupling, Thermal Diode, and Thermal Information Storage

K. Ito^{1,2}, A. Miura¹, K. Nishikawa¹, H. Iizuka¹, and H. Toshiyoshi², ¹Toyota Central R&D Labs., Inc., ²RCAT, The University of Tokyo, Japan

10:00-10:30 **Coffee Break**

Session Tu-6A: Functional Imaging (Chair: Yasunori Toda)

10:30-11:00 **Tu-6A-1: Invite**

Development of Advanced Near-field Imaging Methods for Visualization of Plasmon Modes in Metal Nanostructures

K. Imura¹, H. Mizobata¹, and K. Imaeda¹, ¹Waseda University, Japan

11:00-11:15 **Tu-6A-2**

"Photon-less" Optical Nano-imaging

A. Ambrosio^{1,2,3} and W. L. Wilson¹, ¹Center for Nanoscale Systems, Faculty of Arts and Sciences, Harvard University, USA, ²Harvard John A. Paulson School of Engineering and Applied Sciences, Harvard University, USA, ³CNR-SPIN, Dipartimento di Fisica, Università di Napoli Federico II, Complesso Universitario di Monte Sant'Angelo, Italy

11:15-11:30 **Tu-6A-3**

Label-free Cellular Structure Imaging with High Spatial Resolution by the Electron Beam Excitation-assisted Optical Microscope

M. Fukuta¹, Y. Masuda¹, W. Inami² and Y. Kawata², ¹Graduate School of Science and Technology, Shizuoka University, Japan, ²Research Institute of Electronics, Shizuoka University, Japan

11:30-11:45 **Tu-6A-4**

Nanoscale Chemical Imaging by Photo-induced Force Microscopy

W. Morrison, K. Park, D. Nowak, and S. Park, *Molecular Vista, USA*

11:45-12:00 **Tu-6A-5**

Optofluidic Near-field Optical Microscopy: How Microbeads can Reveal Photonic Nanopatterns

C. Pin^{1,2,3,4}, C. Renaut^{1,2,3,4}, E. Picard^{2,3}, D. Peyrade⁴, E. Hadji^{2,3}, F. de Fornel¹, and B. Cluzel¹, ¹Groupe Optique de Champ Proche - LRC SiNOPTIQ du CEA n°DSM-08-36, Laboratoire Interdisciplinaire Carnot de Bourgogne UMR CNRS 6303, Université de Bourgogne- Franche Comté, France, ²Univ. Grenoble Alpes, INAC-SP2M-SINAPS, F-38000 Grenoble, France, ³CEA, INAC-SP2M-SINAPS, France, ⁴Univ. Grenoble Alpes, CNRS, CEA-Leti Minatec, LTM, France

12:00-12:15 **Tu-6A-6**

Mapping the Local Particle Plasmon Sensitivity with a Scanning Probe

M. K. Krug, G. Schaffernak, J. R. Krenn, and A. Hohenau, *University of Graz, Austria*

Session Tu-6B: Metamaterials (Chair: Olivier Martin)

10:30-11:00 **Tu-6B-1: Invite**

Manipulating the Hybridisation of Chiral Plasmonic Metamaterials using Molecular and Macromolecular Stereostructure

Calum Jack¹, Affar S. Karimullah¹, Ryan Tullius¹, Vincent M. Rotello³, Graeme Cooke¹, Nikolaj Gadegaard², Laurence D. Barron¹, Malcolm Kadodwala¹, ¹School of Chemistry, Joseph Black Building, University of Glasgow, UK, ²School of Engineering, Rankine Building, University of Glasgow, UK, ³Department of Chemistry, University of Massachusetts Amherst, USA

11:00-11:15 **Tu-6B-2**

Harnessing Blackbody Radiation with Metasurfaces

Emilie Sakat, Leo Wojszwyk, Jean-Paul Hugonin, François Marquier, Jean-Jacques Greffet, *Laboratoire Charles Fabry, Institut d'Optique Graduate School, CNRS, Université Paris Saclay, France*

- 11:15-11:30 **Tu-6B-3**
Metamaterial Device for THz Wave Imaging System
 Zhengli Han¹, Seigo Ohno², Yu Tokizane¹, Kouji Nawata¹, Mio Koyama¹, Takashi Notake¹, Yuma Takida¹, Yoichi Ogata¹, Shin'ichiro Hayashi¹, Hiroaki Minamide¹
¹Tera-Photonics Research Team, RIKEN Center for Advanced Photonics, Japan, ²Department of Physics, Tohoku University, Japan
- 11:30-11:45 **Tu-6B-4**
Conductive Oxides Trench Structures as Hyperbolic Metamaterials in Mid-infrared Range
 O. Takayama¹, E. Shkondin^{1,2}, M. E. Aryaee Panah¹, T. Repän¹, R. Malureanu¹, F. Jensen², and A. V. Lavrinenko¹, ¹DTU Fotonik-Department of Photonics Engineering, Technical University of Denmark, Denmark, ²DTU Danchip-National Center for Micro- and Nanofabrication, Technical University of Denmark, Denmark
- 11:45-12:00 **Tu-6B-5**
Cavity-free Lasing in Graphene-based Random Metamaterials
 A. Marini¹ and F. J. García de Abajo², ¹ICFO-Institut de Ciències Fotoniques, The Barcelona Institute of Science and Technology, Spain, ²ICREA-Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys 23, Spain
- 12:00-12:15 **Tu-6B-6**
Large Area Fabrication of Stacked Optical Magnetic Metamaterial by Nanosphere Lithography
 T. Okamoto, K. Tanikawa, N. Tamura and M. Haraguchi,
 Department of Optical Science, Division of Science and Technology, Tokushima University, Tokushima, Japan
- 12:15-13:30 **Lunch & Luncheon Seminars (WITec GmbH & Nihon Thermal Consulting)**

Session Tu-7A: Enhanced Raman Spectroscopy (Chair: Volker Deckert)

- 13:30-14:00 **Tu-7A-1: Invite**
Nanogap Enhancement in Raman Scattering
 Yung Doug Suh, *Research Center for Convergence NanoRaman Technology (RC2NT), Korea Research Institute of Chemical Technology (KRICT), South Korea and School of Chemical Engineering, Sungkyunkwan University (SKKU), South Korea*
- 14:00-14:15 **Tu-7A-2**
Gap-mode Induced Laser Trapping of Silver Nanoparticles towards Single Molecule Sensitivity in Raman Scattering
 C. Iida, M. Ishikura, K. Akai, J. Murakami, and M. Futamata, *Saitama University, Japan*
- 14:15-14:30 **Tu-7A-3**
QED description of Surface Enhanced Raman Spectroscopy
 M. K. Schmidt¹, R. Esteban¹, A. Gonzalez-Tudela², G. Giedke¹, and J. Aizpurua¹
¹Materials Physics Center CSIC-UPV/EHU, and DIPC, Spain,
²Max-Planck-Institut für Quantenoptik, Germany
- 14:30-14:45 **Tu-7A-4**
Detailed Examination of Electromagnetic Interaction between Plasmon and Molecular Exciton by Surface Enhanced Spectroscopy
 T. Itoh¹ and Y. S. Yamamoto^{2,3}, ¹National Institute of Advanced Industrial Science and Technology (AIST), Japan, ²Research Fellow of the Japan Society for the Promotion of Science, Japan, ³Department of Advanced Materials Sciences, Kagawa University, Japan
- 14:45-15:15 **Tu-7A-5: Invite**
Understanding the TERS Effect with a Multiprobe System Providing for On-line Tunneling and NSOM with Raman Integration
 Aaron Lewis¹, Rimma Dekhter², Patricia Hamra², Yossi Bar-David², and Hesham Taha², ¹Department of Applied Physics, The Hebrew University of Jerusalem, Israel, ²Nanonics Imaging Ltd, Jerusalem, Israel

Session Tu-7B: Ultrafast Nanophotonics (Chair: Hiromi Okamoto)

- 13:30-14:00 **Tu-7B-1: Invite**
Ultrafast Nanophotonics and Imaging of Light Harvesting, Hot Electron, and Charge Separation Processes
 G. P. Wiederrecht
Nanoscience & Technology Division, Argonne National Laboratory, USA
- 14:00-14:15 **Tu-7B-2**
Sub-cycle Optical Phase Control of Electron Nanotunneling
 D. Brida, T. Rybka, M. Ludwig, M. Schmalz, V. Knittel, and A. Leitenstorfer
Dept. of Physics and Center for Applied Photonics, Univ. of Konstanz, Germany
- 14:15-14:30 **Tu-7B-3**
Ultrafast ZnO Nanowire Lasers: Nanoplasmonic Acceleration of Gain Dynamics at the Surface Plasmon Polariton Frequency
 Themistoklis P. H. Sidiropoulos¹, Robert Röder², Sebastian Geburt², Ortwin Hess¹, Stefan A. Maier¹, Carsten Ronning², and Rupert F. Oulton¹
¹Imperial College London, UK, ²University of Jena, Germany

14:30-14:45 **Tu-7B-4**
Nonlocal and Quantum Finite-size Effects in the Nonlinear Optical Response of Graphene Plasmons
J. D. Cox¹ and F. J. García de Abajo^{1,2}, ¹ICFO-Institut de Ciències Fòniques, The Barcelona Institute of Science and Technology, Spain, ²ICREA-Institució Catalana de Recerca i Estudis Avançats, Passeig Lluís Companys 23, Spain

14:45-15:15 **Tu-7B-5: Invite**
Probing Quantum Phenomena in Graphene by Infrared Nano-Imaging of Plasmonic Waves
D. N. Basov, *Department of Physics, Columbia University, USA*

15:15-15:45 **Coffee Break**

Session Tu-8A: Optical Characterization (Chair: Francesca Intonti)

15:45-16:15 **Tu-8A-1: Invite**
Plasmonic Application with 2D Materials and Its Near-field Optical Characterizations
Xing Zhu and Zheyu Fang, *School of Physics, State Key Laboratory for Mesoscopic Physics, Peking University, China*

16:15-16:30 **Tu-8A-2**
Optical Near Field Imaging of the Local Density of Electromagnetic Guided Modes in Integrated Optical Waveguides on Glass
J. Beltran-Madrigal¹, R. Salas-Montiel¹, F. Gardillou², C. Couteau¹, D. Barbier², and S. Blaize¹, ¹Laboratoire de Nanotechnologie et d'Instrumentation Optique, CNRS-UMR 6281, Université de technologie de Troyes, France, ²Teem Photonics, France

16:30-16:45 **Tu-8A-3**
Unravelling Near-field Measurements without a-priori Knowledge -Separate, Simultaneous Mapping of Electric and Magnetic Fields-
B. le Feber^{1,2}, N. Rotenberg^{1,3}, J. E. Sipe⁴, and L. Kuipers¹
¹FOM Institute AMOLF, The Netherlands, ²Optical Materials Engineering Laboratory, ETH Zurich, Switzerland, ³Max Planck Institute for the Science of Light, Germany, ⁴Department of Physics, University of Toronto, Canada

16:45-17:00 **Tu-8A-4**
Imaging of Near-field Interference Patterns by a-SNOM: an Influence of Illumination Wavelength and Polarization State
P. Dvořák^{1,2}, Z. Édes^{1,2}, M. Kvapil^{1,2}, T. Šamořil^{1,2}, F. Ligmajer^{1,2}, M. Hrtoň^{1,2}, R. Kalousek^{1,2}, V. Křápek^{1,2}, P. Dub^{1,2}, P. Varga², and T. Šikola^{1,2}
¹Institute of Physical Engineering, Brno University of Technology, Czech Republic
²Central European Inst. of Technology, Brno Univ. of Technology, Czech Republic

17:00-17:15 **Tu-8A-5**
Multi-tap CMOS Lock-in Pixel Image Sensor for Time-resolved Imaging and Its Applications
Min-Woong Seo, Keiichiro Kagawa, Keita Yasutomi, Yoshimasa Kawata, Masatsugu Niwayama, and Shoji Kawahito
Research Institute of Electronics, Shizuoka University, Japan

17:15-17:30 **Tu-8A-6**
Nanoantennas for Cavity QED: Mapping the Coupling Strength g with Nanometer Resolution
A. Singh¹, P. M. de Roque¹, G. Calbris¹, J. T. Hugall¹, and N. F. van Hulst^{1,2}
¹ICFO – The Institute of Photonic Sciences, The Barcelona Institute of Science and Technology, Spain, ²ICREA- Institució Catalana de Recerca i Estudis Avançats, Spain

Session Tu-8B: Nanoparticle Applications (Chair: Michel Orrit)

15:45-16:15 **Tu-8B-1: Invite**
Single-molecule Strong-coupling and Nanocavity Dynamics
Jeremy J. Baumberg
NanoPhotonics Centre, Cavendish Laboratory, University of Cambridge, UK

16:15-16:30 **Tu-8B-2**
Controlling Fano Resonances and Scattering Directionality of High-index Dielectric Nanostructures by Thermal Oxidation
T. Yano^{1,2}, Y. Tsuchimoto¹, T. Hayashi^{1,2}, and M. Hara^{1,2}
¹Tokyo Institute of Technology, Japan, ²RIKEN, Japan

16:30-16:45 **Tu-8B-3**
Nonlocal Inhomogeneous Broadening in Plasmonic Nanoparticle Ensembles
C. Tserkezis¹, J.R. Maack¹, Z. Liu², M. Wubs^{1,3}, and N.A. Mortensen^{1,3}, ¹Technical University of Denmark, Department of Photonics Engineering, Denmark, ²University of California, San Diego, Department of Electrical and Computer Engineering, USA, ³Technical University of Denmark, Center for Nanostructured Graphene, Denmark

16:45-17:00 **Tu-8B-4**
Collective Excitation Transfer Dynamics due to Locally Non-thermal Phonon Environment
R. Okada, T. Yazaki, K. Uchiyama, H. Hori, A. Ishikawa, and K. Kobayashi
University of Yamanashi, Japan

- 17:00-17:15 **Tu-8B-5**
Dynamic Surface-enhanced Raman Scattering (SERS) Imaging of Intracellular Transportation in 3D
K. Bando¹, K. Mochizuki¹, J. Ando¹, K.-C. Huang², N. I. Smith³, K. Fujita¹, and S. Kawata¹, ¹Deptment of Applied Physics, Osaka Univ., Japan, ²Weldon School of Biomedical Engineering, Purdue Univ., USA, ³Immunology Frontier Research Center, Osaka Univ., Japan
- 17:15-17:30 **Tu-8B-6**
Plasmonic Nanostructures Fabricated by Template Stripping and Its Applications on Second-harmonic Generation and Two-dimensional Materials
Zhaogang Dong¹ and Joel K. W. Yang^{1,2}, ¹Institute of Materials Research and Engineering, A*STAR (Agency for Science, Technology and Research) Singapore, ²Singapore University of Technology and Design, Singapore
- 17:30-19:00 **Session Tu-9P: Poster Session 1 (Chair: Wataru Inami)**
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Wednesday September 7, 2016

Session We-10A: Near-field Theory (Chair: Achim Hartschuh)

- 08:30-09:00 **We-10A-1: Invite**
How to Control the Classical and Quantum Coherence of Light Emitted by Two Dipole Sources
R. Carminati¹ and A. Canaguier-Durand², ¹Institut Langevin, ESPCI ParisTech, CNRS, PSL Research University, France, ²Laboratoire Kastler Brossel, UPMC Sorbonne Universités, CNRS, ENS, PSL Research University, France
- 09:00-09:15 **We-10A-2**
Local Circular Polarizations in Random Nanostructures Induced by Linear Polarization via Optical Near-fields
M. Naruse¹, T. Tani², T. Inoue³, H. Yasuda², H. Hori⁴, and M. Naya², ¹National Institute of Information and Communications Technology, Japan, ²Fujifilm Corporation, Japan, ³Yamanashi Industrial Technology College, Japan, ⁴University of Yamanashi, Japan
- 09:15-09:30 **We-10A-3**
Quantum Active Plasmonics
D. C. Marinica¹, M. Zapata^{1,2}, G. Aguirregabiria², R. Esteban², A.K. Kazansky³, A.G. Borisov¹, and J. Aizpurua², ¹Institut des Sciences Moléculaires d'Orsay-UMR 8214, CNRS-Université Paris Sud, France, ²Materials Physics Center (CSIC-UPV/EHU) and DIPC, Spain, ³KERBASQUE, Basque Foundation for Science, Spain
- 09:30-09:45 **We-10A-4**
Dipole Forbidden Transition Induced by Optical Near-field Interaction
M. Yamaguchi¹ and K. Nobusada²,
¹The University of Tokyo, Japan, ²Institute for Molecular Science, Japan
- 09:45-10:00 **We-10A-5**
Response Theory in Near-field Optics: Two Distinct Dipole Transitions
I. Banno, Interdisciplinary Graduate School of Medicine and Engineering, University of Yamanashi, Japan

Session We-10B: Near-field Spectroscopy (Chair: Kobus Kuipers)

- 08:30-09:00 **We-10B-1: Invite**
Micro-spectroscopy of Single Gold Nanoparticles and of Single Molecules
M. Orrit, MoNOS, Leiden Institute of Physics, Netherlands
- 09:00-09:15 **We-10B-2**
Broadband Synchrotron Infrared Nanospectroscopy by Self-referenced Interferometry
Benjamin Pollard², Francisco C. B. Maia¹, Markus B. Raschke² and Raul O. Freitas¹
¹Brazilian Synchrotron Light Laboratory, Brazil, ²Department of Physics, Department of Chemistry and Joint Institute for Lab Astrophysics (JILA), Univ. of Colorado, USA
- 09:15-09:30 **We-10B-3**
Development of Dual-probe Scanning Near-field Optical Microscopy (DSNOM) Utilizing Ultrafast Plasmonic Nanofocusing for Spatiotemporal Measurements
Y. Kojima, Y. Masaki and F. Kannari
Department of Electronics and Electrical Engineering, Keio University, Japan
- 09:30-09:45 **We-10B-4**
Coherent Acoustic Phonon Vibration of Pd and Ag/Pd/Ag Sandwich Nanoplates
L. Wang, T. Sagaguchi, T. Okuhata, M. Tsuboi, and N. Tamai
School of Science and Technology, Kwansai Gakuin University, Japan
- 09:45-10:00 **We-10B-5**
The SINS of Plasmons and Polaritons: Nanospectral Imaging with a Synchrotron Source
Hans A. Bechtel¹, Michael C. Martin¹, Eric A. Muller², Zhiwen Shi³, Rob W. Johns⁴, Samuel Berweger⁵, Feng Wang³, Delia J. Milliron⁴, and Markus B. Raschke²
¹Advanced Light Source, Lawrence Berkeley National Laboratory, USA, ²University of Colorado at Boulder, USA, ³University of California, Berkeley, USA, ⁴University of Texas at Austin, USA, ⁵National Institute of Standards and Technology, USA

10:00-10:30 **Coffee Break**

Session We-11A: Chemistry & Biology (Chair: Renaud Bachelot)

10:30-11:00 **We-11A-1: Invite**

Optical Near-field Etching

Takashi Yatsui, *The University of Tokyo, Japan*

11:00-11:15 **We-11A-2**

Nanoscale Spectroscopy Unravels Inhibition Mechanism for Amyloid Fibrillation

T. Deckert-Gaudig¹ and V. Deckert^{1,2},

¹*Leibniz Institute of Photonic Technology, Germany, ²Institute of Physical Chemistry and Abbe Center of Photonics, Friedrich Schiller, Germany*

11:15-11:30 **We-11A-3**

Fluorescence Detection of Pathogenic Particles Based on Surface Plasmon Heating Enhanced DNA Elongation

Y. Kawahara and A. Ishida, *Graduate School of Life and Environmental Sciences, Kyoto Prefectural University, Japan*

11:30-11:45 **We-11A-4**

Multiplex Detection of Urinary MicroRNA using Gold Nanoslit Array Surface Plasmon Resonance

Mansoureh Z. Mousavi¹, Huai-Yi Chen^{1,2,3}, Wing Kiu Yeung¹, Heng Lin⁶, Hsi-Hsien Chen^{7,8}, Tung-Han Hsieh¹, Pei-Kuen Wei¹, Ji-Yen Cheng^{1,3,4,5}

¹*Research Center for Applied Sciences, Academia Sinica, Taiwan, ²Department of Engineering and System Science, National Tsing Hua University, Taiwan, ³Nano Science and Technology Program, Taiwan International Graduate Program, Academia Sinica and National Tsing Hua University, Taiwan, ⁴Institute of Biophotonics, National Yang-Ming University, Taiwan, ⁵Department of Mechanical and Mechatronic Engineering, National Taiwan Ocean University, Taiwan, ⁶Department of Physiology, School of Medicine, College of Medicine, Taipei Medical University, Taiwan, ⁷Department of Internal Medicine, School of Medicine, College of Medicine, Taipei Medical University, Taiwan, ⁸Division of Nephrology, Department of Internal Medicine, Taipei Medical University Hospital, Taiwan*

11:45-12:00 **We-11A-5**

Gold Mesoporous Structures with Aligned Hotspots on Highly-oriented Mesoporous Silica Films

S. Murai^{1,2}, S. Uno², R. Kamakura², K. Fujita² and K. Tanaka²,

¹*Department of Material Chemistry, Graduate School of Engineering, Kyoto University, Japan, ²PRESTO, Japan Science and Technology Agency (JST), Japan*

12:00-12:15 **We-11A-6**

The Bio-application of Yellow Fluorescent Polymer-stabilized Platinum Nanoclusters

Xin Huang¹, Kazuki Tsutsukawa¹, Hidekazu Ishitobi^{1,2}, and Yasushi Inouye^{1,2,3}

¹*Graduate School of Frontier Biosciences, Osaka Univ., Japan, ²Department of Applied Physics, Osaka Univ., Japan, ³Photonics Advanced Research Center, Osaka Univ., Japan*

Session We-11B: Nonlinear & Ultrafast (Chair: Gary Wiederrecht)

10:30-11:00 **We-11B-1: Invite**

Space-time-resolved Spectroscopy of Nanomaterials

Tobias Brixner

Institut für Physikalische und Theoretische Chemie, Universität Würzburg, Germany

11:00-11:15 **We-11B-2**

Controlled Second Harmonic Generation with Single Nanoantennas

Ion M. Hancu¹ and Niek F. van Hulst^{1,2}, ¹*ICFO - The Institute of Photonic Sciences, Spain, ²Institució Catalana de Recerca i Estudis Avançats (ICREA), Spain*

11:15-11:30 **We-11B-3**

Enhanced Second Harmonic Generation from Multiresonant Gold Nano-structures

M. Celebrano¹, X. Wu^{2,3}, M. Baselli¹, S. Großmann², P. Biagioni¹, A. Locatelli⁴, C. De Angelis⁴, G. Cerullo^{1,5}, R. Osellame⁵, B. Hecht², L. Duò¹, F. Ciccacci¹, and M. Finazzi¹, ¹*Physics Department, Politecnico Milano, Italy, ²Nano-Optics & Biophotonics Group - Department of Physics - Experimental Physics 5, University of Würzburg, Germany, ³Ultrafast Nanooptics Group - Department of Physics - Experimental Physics III, University of Bayreuth, Germany, ⁴Department of Information Engineering, University of Brescia, Italy, ⁵IFN-CNR - Physics Department, Politecnico Milano, Italy*

11:30-11:45 **We-11B-4**

Controlling the Dynamics, the Modal Extension and the Yield of Nonlinear Au Photoluminescence Emitted from Optical Antennas

S. Viarbitskaya¹, O. Demichel¹, R. Méjard¹, U. Kumar², Ch. Girard², A. Cuhe², E. Dujardin², B. Cluzel¹, G. Colas des Francs¹, and A. Bouhelier¹

¹*Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303 CNRS, Université Bourgogne Franche-Comté, France, ²CEMES CNRS UPR 8011 and Université Fédérale de Toulouse, France*

11:45-12:00 **We-11B-5**

Femtosecond Near-field Imaging with Plasmonic Nanofocused Four-wave Mixing

Vasily Kravtsov¹, Ronald Ulbricht¹, Joanna M. Atkin², and Markus B. Raschke¹,

¹*Dep. of Physics, Dep. of Chemistry, & JILA, University of Colorado, USA, ²Department of Chemistry, University of North Carolina, USA*

12:00-12:15 **We-11B-6**

Reconfigurable Optical Nanoantennas in the Visible Range

Bert Hecht¹, Kai Chen^{1,2}, Gary Razinskas¹, Thorsten Feichtner^{1,3,4}, Swen Grossmann¹, and Silke Christiansen^{3,4}

¹Nano-Optics & Biophotonics Group, Experimental Physics 5, Wilhelm Conrad Röntgen-Center for Complex Material Systems (RCCM), University of Würzburg, Germany, ²International Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS), Japan, ³Christiansen Research Group, Max Planck Institute for the Science of Light, Germany, ⁴Institute Nano-Architectures for Energy Conversion, Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Germany

12:15-13:30 **Lunch & Luncheon Seminar (Nanonics Imaging)**

Session We-12A: Light Control (Chair: Javier Aizpurua)

13:30-14:00 **We-12A-1: Invite**

Manipulation of Polarization and Spatial Properties of Light with Arrays of Nanoholes

Vasily Klimov, P. N. Lebedev Physical Institute, Russian Academy of Sciences, Russia and All-Russia Research Institute of Automatics, Russia

14:00-14:15 **We-12A-2**

Control of Energy Flow within Subwavelength Metallic Gratings

G. Kang, P. Li, and X. Tan, School of Optoelectronics, Beijing Institute Technology, China

14:15-14:30 **We-12A-3**

Coherent Control of Free Electrons by Optical Near-fields

K. E. Echternkamp¹, A. Feist¹, S. Schäfer¹ and C. Ropers¹

¹4th Physical Institute – Solids and Nanostructures, University of Göttingen, Germany

14:30-14:45 **We-12A-4**

Probing and Controlling Optical Coherences in Single Nanostructures and 2D Materials

R. Ciesielski¹, V. Giegold¹, A. Biewald¹, N. F. Hartmann², E. H. Hároz², A. Comin¹, H. Budde¹, S. K. Doorn², and A.

Hartschuh¹, ¹Department Chemie and CeNS, LMU Munich, Germany, ²Center for Integrated Nanotechnologies, Materials Physics and Applications Division, Los Alamos National Laboratory, USA

14:45-15:00 **We-12A-5**

Nanoscale Plasmon-enhanced Spectroscopy in Memristive Switches

G. Di Martino¹, S. Tappertzhofen², S. Hofmann², and J. Baumberg¹

¹NanoPhotonics Centre, Cavendish Laboratory, University of Cambridge, UK, ²Department of Engineering, Electronic Engineering Division, University of Cambridge, UK

15:00-15:15 **We-12A-6**

2D Photonic Nanojet via Bloch Surface Wave: Limitations and Beyond

M.-S. Kim, R. Dubey, E. Barakat, and H. P. Herzig, Optics & Photonics Technology Laboratory, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland

Session We-12B: Quantum Interactions (Chair: Kiyoshi Kobayashi)

13:30-14:00 **We-12B-1: Invite**

Strong Coupling of Quantum Emitters and Light in Nanoplasmonic Cavities and at Stopped-light Singularities

O. Hess¹ and J. J. Baumberg², ¹The Blackett Laboratory, Department of Physics, Imperial College London, London, UK,

²The Cavendish Laboratory, Department of Physics, Cambridge University, Cambridge, UK

14:00-14:15 **We-12B-2**

Experiments in Quantum Plasmonics

Marie-Christine Dheur¹, Benjamin Vest¹, Eloïse Devaux², Thomas W. Ebbesen², Alexandre Baron³, Jean-Claude

Rodier¹, Jean-Paul Hugonin¹, Philippe Lalanne⁴, Jean-Jacques Greffet¹, Gaétan Messin¹ et François Marquier¹,

¹Laboratoire Charles Fabry, Institut d'Optique, CNRS, Université Paris-Saclay, France, ²Institut de Science et d'Ingénierie

Supramoléculaire, CNRS, Université de Strasbourg, France, ³Centre de Recherche Paul Pascal, CNRS, 33600 Pessac, France,

⁴Laboratoire Photonique, Numérique et Nanosciences, Institut d'Optique, CNRS, Université de Bordeaux, France

14:15-14:30 **We-12B-3**

Quantum Plasmonics in Linear Atomic Chains

Garnett W. Bryant, Quantum Measurement Division and Joint Quantum Institute, National Institute of Standards and Technology, USA

14:30-14:45 **We-12B-4**

Mode Hybridization in a Strongly Coupled Plasmon-emitter System

H. Varguet¹, B. Rousseaux¹, D. Dzsotjan^{1,2}, H. Jauslin¹, S. Guérin¹, and G. Colas des Francs¹, ¹Laboratoire

Interdisciplinaire Carnot de Bourgogne (ICB), CNRS UMR 6303, Université Bourgogne Franche-Comté, France, ²Wigner

Research Center for Physics, Hungarian Academy of Sciences, Hungary

14:45-15:00 **We-12B-5**

Coupling Quantum Dots to Plasmonic Nanowires

M. Belitsch, M. Gasparic, C. Gruber, A. Hohenau, and J.R. Krenn, Univ. of Graz, Austria

15:00-15:15 **We-12B-6**

Chiral Optical Local Density of States in a Spiral Plasmonic Cavity

A. Pham¹, M. Berthel¹, Q. Jiang¹, S. Huant¹, C. Genet² and A. Drezet¹,

¹*Institut Néel, CNRS-Université Grenoble Alpes, 25 avenue des Martyrs, 38042 Grenoble, France,*

²*ISIS, CNRS-Université de Strasbourg, 8, allée Monge, 67000 Strasbourg, France*

15:15-15:45 **Coffee Break**

Session We-13A: Graphene (Chair: Prabhat Verma)

15:45-16:15 **We-13A-1: Invite**

Plasmons in 2D Heterostructures

F. H. L. Koppens,

ICFO-Institut de Ciències Fotoniques, The Barcelona Institute of Science and Technology, Spain and ICREA – Institució Catalana de Recerca i Estudis Avançats, Spain

16:15-16:30 **We-13A-2**

TERS Based Strain Mapping of Indented Graphene-based Systems

E. L. Wood¹, Y. Yang¹, Will Gannett², G. A. Shaw¹, R. E. Elmquist¹, M. W. Keller², A. R. Hight Walker¹, ¹*National Institute of*

Standards and Technology, Gaithersburg, USA, ²National Institute of Standards and Technology, Boulder, USA

16:30-16:45 **We-13A-3**

Near-field Investigation of Plasmons in Graphene Etched by Ion Beams

W. W. Luo, W. Cai, W. Wu, Y. X. Xiang, M. X. Ren, X. Z. Zhang, and J. J. Xu

School of Physics and TEDA Applied Physics Institute, Nankai University, China

16:45-17:00 **We-13A-4**

Detection of Exotic Transverse Electric Mode in Graphene

S. Menabde¹, D. Mason¹, E. Kornev², C. Lee², and N. Park¹, ¹*Photonic Systems Laboratory, Dept. of ECE, Seoul National*

University, South Korea, ²Organic Semiconductor Laboratory, Dept. of ECE, Seoul National University, South Korea

17:00-17:15 **We-13A-5**

Emission Enhancement due to Exciton-plasmon Coupling in Graphene Oxide and Electrostatically Induced Quenching

A. Neogi¹, S. Karna², F. D'Souza³ and T. Choi², ¹*Department of Physics, University of North Texas, USA, ²Department of*

Mechanical & Energy Eng., University of North Texas, USA, ³Department of Chemistry, University of North Texas, Denton, USA

Session We-13B: Thin Film Optics (Chair: Martin Schnell)

15:45-16:15 **We-13B-1: Invite**

On Plasmons and Waveguide Coupling in Layered Structures of Metals and Dielectrics: Fano Resonance and Giant Field Enhancement

Zouheir Sekkat, *Department of Chemistry, Faculty of Sciences, Mohammed V University, Morocco, Optics and Photonics*

Center, Moroccan Foundation for Advanced Science, Innovation and Research, Morocco, Photonics Advanced Research

Center, Graduate School of Engineering, Osaka University, Japan

16:15-16:30 **We-13B-2**

Second Harmonic Generation in Metal-insulator-metal Structure Consisting of Ge-doped SiO₂ Thin Film as Insulator

B. J. Kang¹, A. Kitao¹, K. Imakita¹, S. Hayashi^{1,2}, and M. Fujii¹

¹*Graduate School of Engineering, Kobe University, Japan, ²Optics and Photonics Center, Moroccan Foundation for Science, Innovation and Research (MAScIR), Morocco*

16:30-16:45 **We-13B-3**

Nanoscale Optical Dichroism: from Amorphous Azo-polymers to Optical Information Storage

S. S. Kharintsev^{1,2}, A. I. Fishman¹, and S. G. Kazarian³

¹*Institute of Physics, Kazan Federal University, Russia, ²Tatarstan Academy of Sciences, Russia, ³Department of Chemical*

Engineering, Imperial College London, UK

16:45-17:00 **We-13B-4**

Active Terahertz and Microwave Metadevices Based on π -conjugated Polymers

T. Matsui^{1,2}, Y. Inose¹, H. Mori¹, T. Kinoshita¹, M. Liu³, D. A. Powell³, and I. V. Shadrivov³, ¹*Department of Electrical and*

Electronic Engineering, Graduate School of Engineering, Mie University, Japan, ²The Center of Ultimate Technology on

Nano-Electronics, Mie University, Japan, ³Nonlinear Physics Centre and Centre for Ultrahigh bandwidth Devices for

Optical Systems Australian National University, Australia

17:00-17:15 **We-13B-5**

Introducing 2D Nano-FTIR

S. Amarie, *neaspec, Germany*

17:30-19:00 **Session We-14P: Poster Session 2 (Chair: Atsushi Ono)**

Thursday September 8, 2016

Session Th-15A: UV Applications (Chair: Norihiro Umeda)

08:30-09:00 **Th-15A-1: Invite**

Chemical Synthesis of Small Aluminium Nanoparticles: Beyond UV Plasmonics

J. Proust, S. Schuermans, J. Martin, D. Gérard, T. Maurer and J. Plain

LNIO/ICD, UMR CNRS 6281, Université de technologie de Troyes, France

09:00-09:15 **Th-15A-2**

Plasmon Linewidth Narrowing of an Aluminum Nanoparticle Coupled to an Aluminum Film

A. Manjavacas¹, A. Sobhani², Y. Cao³, M. J. McClain⁴, F. J. García de Abajo⁵, P. Nordlander³, and N. Halas^{2,3,4},

¹Department of Physics and Astronomy, University of New Mexico, USA, ²Department of Electrical and Computer Engineering, Rice University, USA, ³Department of Physics and Astronomy, Rice University, Houston, USA, ⁴Department of Chemistry, Rice University, USA, ⁵ICFO - Institut de Ciències Fotoniques, The Barcelona Institute of Science and Technology, Spain and ICREA-Institució Catalana de Recerca i Estudis Avançats, Spain

09:15-09:30 **Th-15A-3**

Aluminum Nanoparticle Synthesis via Vacuum Deposition onto Ionic Liquids

H. Nagasaki¹, T. Mochizuki¹, R. Hamaoka¹, K. Iwami¹, A. Taguchi², H. Ohno¹,

and N. Umeda¹, ¹Tokyo University of Agriculture and Technology, Japan, ²Osaka University, Japan

09:30-09:45 **Th-15A-4**

UV Fluorescence Lifetime Modification by Al and Mg Nanoapertures

Yunshan Wang¹, Xiaojin Jiao², Eric M. Peterson³, Kanagasundar Appusamy⁴, Sivaraman Guruswamy⁴, Joel M. Harris³, and Steve Blair¹,

¹Electrical and Computer Engineering, USA, ²Intel Corporation, USA, ³Department of Chemistry, USA, ⁴Metallurgical Engineering, USA

09:45-10:00 **Th-15A-5**

Ultra-deep UV Plasmonics using Several Metal Nanoparticles

K. Okamoto¹, H. Nishida¹, D. Tanaka², S. Kawamoto¹, K. Tateishi¹, P. Wang³, S. Ryuzaki¹, and K. Tamada¹,

¹Institute for Materials Chemistry and Engineering, Kyushu University, Japan, ²Department of Electrical and Electronic Engineering, National Institute of Technology, Japan, ³Education Center for Global Leaders in Molecular Systems for Devices, Kyushu University, Japan

Session Th-15B: Hybrid Nano-structures (Chair: Bert Hecht)

08:30-09:00 **Th-15B-1: Invite**

Surface Plasmon-assisted Chemical Reactions using Nano-engineered Gold Nanoparticles

K. Ueno and H. Misawa, *Research Institute for Electronic Science, Hokkaido University, Japan*

09:00-09:15 **Th-15B-2**

Freezing Photothermal Convection for Optimal Trapping of Nanoparticle in Two Dimensional Nanoplasmonic Optical Lattice

Yi-Chong Chen and Ya-Tang Yang,

Department of Electrical Engineering, National Tsing Hua University, Taiwan

09:15-09:30 **Th-15B-3**

Solar Thermal-shielding Based on Oxide Plasmonics for Transparent Window Applications

Hiroaki Matsui¹, Shinya Furuta², Takayuki Hasebe³, and Hitoshi Tabata¹, ¹The Univ. of Tokyo, Japan, ²Tomoe Work Co. Ltd, Japan, ³Central Customs Laboratory, Japan

09:30-09:45 **Th-15B-4**

Enhancing Surface Sensitivity of Periodic Metallic Nanostructures using Oblique-angle Induced Fano Resonances

Kuang-Li Lee¹, Chia-Chun Chang², Meng-Lin You¹, Ming-Yang Pan¹, and Pei-Kuen Wei^{1,2,3}, ¹Research Center for Applied Sciences, Academia Sinica, Taiwan, ²Department of Optoelectronics, National Taiwan Ocean University, Taiwan, ³Institute of Biophotonics, National Yang-Ming University, Taiwan

09:45-10:00 **Th-15B-5**

Nanoscopy Reveals Surface-metallic Black Phosphorus

Yohannes Abate^{1,2}, Sampath Gamage², Li Zhen³, Viktoriia Babicheva^{1,2}, Mohammad H. Javani^{1,2}, Han Wang³, Stephen B. Cronin³, and Mark I. Stockman^{1,2}

¹Center for Nano-Optics (CeNO), Georgia State University, USA, ²Department of Physics and Astronomy, Georgia State University, USA, ³Viterbi School of Engineering, University of Southern California, USA

10:00-10:30 **Coffee Break**

Session Th-16A: Fluorescence Dynamics (Chair: Zouheir Sekkat)

10:30-11:00 **Th-16A-1: Invite**

Enhanced Fluorescence Energy Transfer in Plasmonic Nanoantennas

Jérôme Wenger, *CNRS, Aix-Marseille Université, Institut Fresnel, France*

- 11:00-11:15 **Th-16A-2**
Extension of the FRET Interaction Range in Antenna-coupled Donor-acceptor Pairs
 J. F. Herrmann and C. Höppener
NanoBioPhotonics Group, Institute of Physics, University of Münster, Germany
- 11:15-11:30 **Th-16A-3**
Multicolor Hybrid Plasmonic Nano-emitter Based on Local Anisotropy of the Active Medium
 Xuan Zhou¹, Gerard Colas des Francs², Gary P. Wiederrecht³, Hilmi Volkan Demir⁴, Jerome Plain¹, Xiao Wei Sun⁴,
 Jerome Plain¹, Renaud Bachelot¹, ¹ICD-LNIO, University of Technology of Troyes, France, ²ICB, University of Burgundy,
 France, ³CNM Argonne National Laboratory, USA, ⁴LUMINEOUS! EEE, Nanyang Technological Univ., Singapore
- 11:30-11:45 **Th-16A-4**
Experimental Evidence of Plasmonic Superradiance
 P. Fauché^{1,2}, M. Comesaña-Hermo¹, S. Ravaine¹, R. A. L. Vallée¹, P. Tamarat², B. Lounis²
¹CRPP, UPR8641, CNRS, France, ²LP2N, UMR5298, CNRS-IOGS-Univ. of Bordeaux, France
- 11:45-12:00 **Th-16A-5**
Multicolor Fluorescence Imaging of Living Tumor Cells with the Plasmonic Chip
 K. Tawa^{1,2}, C. Sasakawa^{1,2}, I. Shibata³, S. Yamamura³, and M. Kataoka³, ¹Kwansei Gakuin University, Japan, ²AIST,
 Midorigaoka, Japan, ³AIST, Takamatsu, Japan
- Session Th-16B: Near-field Guiding (Chair: Takayuki, Okamoto)**
- 10:30-11:00 **Th-16B-1: Invite**
Trench Plasmonic Waveguide Integrated in Si Waveguide Circuit
 M. Haraguchi¹, K. Okuda¹, T. Okamoto¹, S. Bando¹, and H. Okamoto²
¹Tokushima University, Japan, ²National institute of Technology, Japan
- 11:00-11:15 **Th-16B-2**
Emission Coupling in Hybrid Plasmonic V-groove Devices
 E. Bermúdez-Ureña¹, G. Tütüncüoğlu², L. Fracavaglia², C. Gonzalez-Ballester³, J. Cuerda³, C.L.C. Smith⁴, E. Moreno³, I.
 P. Radko⁵, S. I. Bozhevolnyi⁵, F.J. García-Vidal³, A. Fontcuberta i Morral², and R. Quidant^{1,6}, ¹ICFO-Institut de Ciències
 Fotòniques, The Barcelona Institute of Science and Technology, Spain, ²Laboratoire des Matériaux Semiconducteurs,
 Institut des Matériaux, Ecole Polytechnique Fédérale de Lausanne, Switzerland, ³Departamento de Física Teórica de la
 Materia Condensada and Condensed Matter Physics Center (IFIMAC), Universidad Autónoma de Madrid, Spain,
⁴Department of Micro- and Nanotechnology, Technical University of Denmark, Denmark, ⁵Department of Technology and
 Innovation, University of Southern Denmark, Denmark, ⁶ICREA – Institució Catalana de Recerca i Estudis Avancats, Spain
- 11:15-11:30 **Th-16B-3**
**Nanoimaging of Fabry-Perot Sheet and Edge Plasmonic Modes in Circular and Rectangular Graphene
 Nanoresonators**
 A. Y. Nikitin^{1,2}, P. Alonso-González^{1,3}, S. Vélez¹, S. Mastel¹, A. Centeno⁴, A. Pesquera⁴, A. Zurutuza⁴, F. Casanova^{1,2}, L. E.
 Hueso^{1,2}, F. H. L. Koppens⁵, and R. Hillenbrand^{2,6}, ¹CIC nanoGUNE, Spain, ²IKERBASQUE, Basque Foundation for Science,
 Spain, ³Institute of Physics, Chinese Academy of Science, China, ⁴Graphenea SA, Spain, ⁵ICFO-Institut de Ciències
 Fotòniques, Spain, ⁶CIC NanoGUNE and EHU/UPV, Spain
- 11:30-11:45 **Th-16B-4**
Campanile Near-field Probes Fabricated by Nanoimprint Lithography
 G. Calafiore¹, A. Koshelev¹, T. Darlington², N. J. Borys², J. Schuck², A. Weber-Bargioni², S. Babin¹, K. Munechika¹, S.
 Cabrini², ¹aBeam Technologies, USA, ²The Molecular Foundry, Lawrence Berkeley National Laboratory, USA
- 11:45-12:00 **Th-16B-5**
Indium-free Organic Solar Cells using a Plasmonic Electrode
 K. Takatori^{1,2,3}, T. Nishino^{1,4}, T. Okamoto^{1,2}, H. Takei⁵, K. Ishibashi¹, and R. Micheletto³
¹RIKEN, Japan, ²Tokyo Institute of Technology, Japan, ³Yokohama City University, Japan, ⁴Sanwa Corporation, Japan,
⁵Toyo University, Japan
- 12:00-12:15 **Closing Remarks (Room A)**
- 12:15-18:30 **Lunch & Excursion**
- 18:30-20:30 **Banquet (Hotel Crown Palais, 3rd Floor, "Matsu no Ma")**