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Nota di contenuto	Real-Time Optical Detection of Single Nanoparticles and Viruses Using Heterodyne Interferometry -- Photonic Metamaterials and Transformation Optics: A Very Brief Introduction and Review -- Plasmonic Enhancement of Light Emission and Scattering in Nanostructures -- Sub-Wavelength Optical Fluorescence Microscopy for Biological Applications -- Raman Spectroscopy and Optical Coherence Tomography on a Micro-Chip: Arrayed-Waveguide-Grating-Based Optical Spectroscopy -- Introduction to Fluorescence Spectroscopy with Applications to Biological Systems -- Nanophotonics: Linear and Nonlinear Optics at the Nanoscale -- Synthesis and Spectroscopy of Nanoparticles -- Photonic-Crystal Fiber Platform for Ultrafast Optical Science -- Structure Property Relationships for Exciton Transfer in Conjugated Polymers -- Coherent Control of Biomolecules and Imaging Using Nanodoublers -- Taking Whispering Gallery Mode Biosensing to the Single Protein Limit -- Terahertz Spectroscopy and Imaging at the Nanoscale for Biological and Security Applications -- Application of Plasmonics in Biophotonics: Laser and Nanostructures for Cell Manipulation -- Principles and Applications of Rare Earth Ion-Doped Nanoparticles -- Is There Segregation of Rare Earth Ions in Garnet Optical Ceramics? -- Random Lasing in Solid State Materials -- Imprint-Templated Nanocoax Array

Architecture: Fabrication and Utilization -- Short Seminars -- Metallic Nanoclusters in Layered Crystals: Spectroscopy and Computer Simulations -- Optical Antennas for Single Emitter Fluorescence Enhancement -- Ultrafast All-Optical Switching in TiO2 -- Coherent Manipulation of Motional States of a Single Trapped Ion -- Thermalization of an Open Quantum System Via Full Diagonalization -- The Role of Localized and Propagating Surface Plasmons in Periodically-Arrayed Nanopillars -- Optical and Structural Properties of Noble Metal Island Films -- Localized Photonic States in Two Dimensional Quasicrystalline Waveguides -- Unified Theoretical Model of Loss Compensation and Energy Transfer for Plasmonic Nanoparticles Coated with a Shell of Active Gain Molecules -- Posters Presentations -- Deep UV Strategy for Discriminating Biomolecules -- Silicon Nanowires Light Emitting Devices at Room Temperature -- Optical and Structural Properties of Europium Oxide Thin Films on Silicon Substrates -- Experimental Indication of Quantum Mechanical Effects in Surface Enhanced IR-Spectroscopy? -- Spectral Dependence of the Amplification Factor in Surface Enhanced Raman Scattering -- Investigation of the Metal - Semiconductor Hybrid Nanostructure as an Active Medium for Laser -- TiO2 for Nonlinear Optical Devices -- Atomic Layer Deposition of Lanthanide Oxides: Exemplified by Europium Oxide -- Tip-Enhanced Raman Scattering from Bridged Metal Nanocones -- Femtosecond Laser Nanofabrication of Metal Structures Through Multiphoton Photoreduction -- Nanostructured Thick-Film Spinel Ceramic Materials for Sensor Device Applications -- Realization of a Two-Dimensional Isotropic Metamaterial: Fabrication of Metallic Structures Based on Stimulated Emission Depletion (STED) Direct Laser Writing (DLW) -- Nanoscale Semiconductor Optical Devices Optical Properties of Thermochromic VO2 Nanoparticles -- Lithium Niobate: The Silicon of Photonics! -- Infrared Induced White Anti-stokes Emission of LiYbP4O12 Nanocrystals -- Enhanced Light Emission from Si Nanocrystals Coupled to Plasmonics Structures -- A Spintronic Single Photon Source and Spin Manipulation in Spininjection-LEDs -- Polarizing Beam Splitter: A New Approach Based on Transformation Optics -- Point Defects Aggregation in Lithium Fluoride Crystals After Irradiation -- Diamond Photonic Crystal Slab with Enhanced Photoluminescence Extraction Efficiency -- Spectral Markers of Erythrocytes on Solid Substrate -- Lanthanide Doped Nanocrystalline Alkaline Earth Fluorides: Synthesis, Structural, Morphological and Spectroscopic Investigation -- Observation of Surface Plasmons in Metal-Coated Tapered Fiber Terminated by a Subwavelength Aperture -- Fabrication of Single-Photon Sources by Use of Pyramidal Quantum-Dot Microcavities -- Investigation of GaN- and CuInGaSe2-Based Heterostructures for Optoelectronic Applications -- Ebic Investigation of the Recombination at the Edges of GaAs Solar Cells -- Dynamical Properties of Cardiomyocytes in Three-Dimensional Polymer Scaffolds -- Femtosecond Laser Doped Silicon for Photovoltaic Applications -- Laser and Optical Properties of Green-Emitting ZnCdSe Quantum Dot Based Heterostructures -- Stokes Parameters Measurements for Whispering Gallery Modes Microcavities Characterization -- Photonic-Crystal Fiber Synthesizers of Ultrafast Lightwaves -- Single Nanoparticle Surface Enhanced Fluorescence.

Sommario/riassunto

This volume presents a considerable number of interrelated contributions dealing with the new scientific ability to shape and control matter and electromagnetic fields on a sub-wavelength scale. The topics range from the fundamental ones, such as photonic metamateriials, plasmonics and sub-wavelength resolution to the more

applicative, such as detection of single molecules, tomography on a micro-chip, fluorescence spectroscopy of biological systems, coherent control of biomolecules, biosensing of single proteins, terahertz spectroscopy of nanoparticles, rare earth ion-doped nanoparticles, random lasing, and nanocoax array architecture. The various subjects bridge over the disciplines of physics, biology and chemistry, making this volume of interest to people working in these fields. The emphasis is on the principles behind each technique and on examining the full potential of each technique. The contributions that appear in this volume were presented at a NATO Advanced Study Institute that was held in Erice, Italy, 3-18 July, 2011. The pedagogical aspect of the Institute is reflected in the topics presented in this volume.