ICQNM 2011

The Fifth International Conference on Quantum, Nano and Micro Technologies

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Nice/Saint Laurent du Var, France

ICQNM 2011 Editors

Vladimir Privman, Clarkson University - Potsdam, USA
Victor Ovchinnikov, Aalto University, Finland
ICQNM 2011, The Fifth International Conference on Quantum, Nano and Micro Technologies

Notes: IARIA Conference

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Dates: from August 21, 2011 to August 27, 2011

Articles

Introducing Interconnection Crossing in Ternary Quantum-dot Cellular Automata
Primoz Pecar
keywords: ternary Quantum-dot Cellular Automaton, tQCA interconnection, tQCA wire, tQCA interconnection crossing, multi-layer design

Effect of Adhesion Layer on Morphology and Optical Properties of Self-Organized Metal Nanostructures
Victor Ovchinnikov
keywords: self-organized; fabrication method; metal nanostructure; random array; plasmonics; SERS substrate

A gradient-based approach to feedback control of quantum systems
Gerasimos Rigatos
keywords: gradient-based feedback control, quantum systems, Schrödinger's equation, Lindblad's equation, Lyapunov stability, LaSalle's invariance principle.

Reflectionless and Equiscattering Quantum Graphs
Taksu Cheon
keywords: quantum graph; singular vertex; quantum wire; inverse scattering
**Combinatorial structures of quantum entangled states**
Hoshang Heydari  
*keywords*: quantum information, quantum entanglement, multipartite quantum systems

**Reduced Hamiltonian Technique for Gate Design in Strongly Coupled Quantum Systems**
Preethika Kumar, Steven Skinner, and Sahar Daraeizadeh  
*keywords*: quantum; nearest-neighbor; gates; controlled-unitary; coupling; Hamiltonian

**Quantum Interaction Approach in Cognition, Artificial Intelligence and Robotics**
Diederik Aerts, Marek Czachor, and Sandro Sozzo  
*keywords*: quantum mechanics; quantum cognition; artificial intelligence; robotics

**Quantum Computing with Charge States in Silicon: Towards a Leadless Approach**
Thierry Ferrus, Rossi Alessandro, Aleksey Andreev, Paul Chapman, and David Arfon Williams  
*keywords*: Quantum computing, silicon, charge qubit, quantum dots

**Quantum Dynamics and Coherence of Qubits**
Vladimir Privman  
*keywords*: qubit, decoherence, exchange, entanglement

**New Method for Representation of Multi-qbit Systems Using Fractals**
Mate Galambos and Sandor Imre  
*keywords*: Quantum information; representation; visualization; fractals; binary trees

**Quantum Structure in Cognition: Fundamentals and Applications**
Diederik Aerts, Liane Gabora, Sandro Sozzo, and Tomas Veloz  
*keywords*: quantum mechanics; quantum cognition; decision theory; information retrieval

**DNA Lattice Nanostructures as Biointerface Materials for Electrochemical Biosensor Studies**
Murugan Veerapandian, Chang-Hyun Jang, Guie-Sam Lim, Sung Ha Park, Min-Ho Lee, and Kyusik Yun  
*keywords*: DNA lattice Biosensor nanobiocomposite

**Improved Linearity CMOS Active Resistor Structure Using Computational Circuits**
Cosmin Popa  
*keywords*: Linearity; active resistor circuit; computational circuits; VLSI design.

**Dry Film Resist Microfluidic Channels on Printed Circuit Board and its Application as Fluidic Interconnection for Nanofluidic Chips: Fabrication Challenges**
Nuria Berenice Palacios Aguilara, Venkata R. S. S. Mokkapati, Jeroen Bastemeijer, Jeff R. Mollinger, and Andre Bossche  
*keywords*: dry film resist; fluidic interconnection; printed circuit board; nanofluidic channels, integration

**The Radiobiological Effect of the TiO2 – Cyclodextrin Suspension**
Mihaela Corneanu, Gabriel Corneanu, Aurel Ardelean, Carmen Lazău, Ioan Grozescu, Nicoleta
G. Hădărugă, Daniel I. Hădărugă, and Lucian Barbu-Tudoran
*keywords*: TiO2-Au, TiO2-Fe, cyclodextrin, chromosome mutations.

**Indirect Eavesdropping in Quantum Networks**
Stefan Rass and Sandra König
*keywords*: Quantum Cryptography, Markov-Chain, Secure Routing, Information-Theoretic Security

**Geometry Induced Microparticle Separation in Passive Contraction Expansion Straight Channels**
Mustafa Yilmaz, Meral Cengiz, Huseyin Kizil, Arzu Ozbey, and Levent Trabzon
*keywords*: microparticle; separation; wall effect; focusing

**Microfluidic gate - Utilization of Self-Assembling, Free-Flowing Superstructures of Superparamagnetic Beads for Enhanced Mixing and Colloidal Separation**
Bernhard Eickenberg, Frank Wittbracht, Andreas Hütten, and Alexander Weddemann
*keywords*: microfluidics, superparamagnetic beads, dipolar coupling, reconfigurable matter, rotating magnetic fields

**Rotating magnetic field assisted formation of highly ordered two-dimensional magnetic bead arrays**
Frank Wittbracht, Bernhard Eickenberg, Alexander Weddemann, and Andreas Hütten
*keywords*: magnetic bead arrays; formation of bead monolayers; rotating magnetic fields

**Microfluidics Blood Separations through Optical Sorting and Deterministic Lateral Displacement**
Alexander Zhbanov and Sung Yang
*keywords*: blood separation; optical sorting; deterministic lateral displacement

**PVC Inorganic Hybrids Based on Kaolinite/Urea Intercalates**
Alena Kalendova, Jitka Zykova, Vlastimil Matejka, Michal Machovský, and Jiri Malac
*keywords*: PVC; composite; kaolinite; urea; DEHP
ICQNM 2011

Foreword

The Fifth International Conference on Quantum, Nano and Micro Technologies (ICQNM 2011), held between August 21-27, 2011 in Nice/Saint Laurent du Var, France, continued a series of events covering particularly promising theories and technologies. The conference covered fundamentals on designing, implementing, testing, validating and maintaining various kinds of materials, systems, techniques and mechanisms related to quantum-, nano- and microtechnologies.

Quantum technologies and nano technologies have a great potential to transform communications telecommunications infrastructure and communication protocols, and computers and networking devices. Nanotechnologies and micro-technologies already made their mark on smart materials, nano-medicine, nano-devices, molecular manufacturing, biotechnology, metrology, airspace.

The advancements in material science and computer science have allowed the building, launching and deploying of space exploration systems that continually do more and more as they become smaller and lighter. As an example, carbon nano-tubes have been created that are 250 times stronger than steel, 10 times lighter, and transparent. Similar advances are occurring in glass, plastics and concrete. Spacecraft are being launched, with hulls that are composed of carbon fibers, a light weight high strength material. Swarms is another concept of nano-robotics; swarms act in unison like bees. They theoretically will act as a flexible cloth like material, as strong as diamond. Interplanetary exploration can be foreseen as being carried on by nano-robots as well.

Electronic devices, medicine, environment, metrology, aerospace programs, clothes and materials, telecommunications, cryptography, semiconductors, manufacturing, and other domains are impacted by the progress on the areas mentioned above. Particularly, micro imaging, nano-medicine: (drug delivery; nano-particles i.e. viruses; proteins.), bio-nanostructures: (nano-tubes, nano-particles), microsystems, micro fluidics: (including nano-fluidics, modeling; fabrication and application), micro instrumentation / implantable microdevices (miniaturized bio-electronic systems etc.) and micro sensors benefits from the progress on quantum, nano and micro technologies.

We take here the opportunity to warmly thank all the members of the ICQNM 2011 technical program committee as well as the numerous reviewers. The creation of such a broad and high quality conference program would not have been possible without their involvement. We also kindly thank all the authors that dedicated much of their time and efforts to contribute to the ICQNM 2011. We truly believe that thanks to all these efforts, the final conference program consists of top quality contributions.

This event could also not have been a reality without the support of many individuals, organizations and sponsors. We also gratefully thank the members of the ICQNM 2011 organizing committee for their help in handling the logistics and for their work that is making this professional meeting a success.

We hope the ICQNM 2011 was a successful international forum for the exchange of ideas and results between academia and industry and to promote further progress in the area of quantum-, nano- and micro-technologies.
We hope Côte d’Azur provided a pleasant environment during the conference and everyone saved some time for exploring the Mediterranean Coast.

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**Quantum control**
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ICQNM 1: Nano Technologies

Introducing Interconnection Crossing in Ternary Quantum-dot Cellular Automata

Primoz Pecar, University of Ljubljana, Faculty of Computer and Information Science, Trzaska 25, 1000 Ljubljana, Slovenia

Effect of Adhesion Layer on Morphology and Optical Properties of Self-Organized Metal Nanostructures

Victor Ovchinnikov, Aalto University, Finland
ICQNM 2: Quantum Technologies I

A gradient-based approach to feedback control of quantum systems

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Marek Czachor, Department of Physics, Politechnika Gdanska, Poland
Sandro Sozzo, Center Leo Apostel, Brussels Free University, Belgium
ICQNM 3: Quantum Technologies II

Quantum Computing with Charge States in Silicon: Towards a Leadless Approach

Thierry Ferrus, Hitachi Cambridge Laboratory, UK
Rossi Alessandro, Hitachi Cambridge Laboratory, UK
Aleksey Andreev, Hitachi Cambridge Laboratory, UK
Paul Chapman, Hitachi Cambridge Laboratory, UK
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Liane Gabora, Department of Psychology, University of British Columbia, Canada
Sandro Sozzo, Center Leo Apostel, Brussels Free University, Belgium
Tomas Veloz, Department of Psychology, University of British Columbia, Canada
ICQNM 4: Micro Technologies

DNA Lattice Nanostructures as Biointerface Materials for Electrochemical Biosensor Studies

Murugan Veerapandian, Kyungwon University, Republic of Korea
Chang-Hyun Jang, Kyungwon University, Republic of Korea
Guie-Sam Lim, LG Electronics., Republic of Korea
Sung Ha Park, Sungkyunkwan University, Republic of Korea
Min-Ho Lee, Korea Electronics Technology Institute, Republic of Korea
Kyusik Yun, Kyungwon University, Republic of Korea

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Jeroen Bastemeijer, Delft University of Technology, The Netherlands
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Andre Bossche, Delft University of Technology, The Netherlands

The Radiobiological Effect of the TiO2 – Cyclodextrin Suspension

Mihaela Corneanu, Banat’s University of Agricultural Sciences and Veterinary Medicine Timisoara, Romania
Gabriel Corneanu, “Vasile Goldis” Western University Arad, Romania
Aurel Ardelean, “Vasile Goldis” Western University Arad, Romania
Carmen Lazu, I.N.C. –D.E.M.C. Timioara, Romania
Ioan Grozescu, I.N.C. –D.E.M.C. Timioara, Romania
Nicoleta G. Hdrug, University of Agricultural Sciences and Veterinary Medicine Timisoara, Romania
Daniel I. Hdrug, “Politehnica” University of Timisoara, Romania
Lucian Barbu-Tudoran, Babe-Bolyai University Cluj-Napoca, Romania
Indirect Eavesdropping in Quantum Networks

Stefan Rass, Universität Klagenfurt, Austria
Sandra König, Universität Klagenfurt, Austria
ICQNM 6: Microfluidics and Nanofluidics

Geometry Induced Microparticle Separation in Passive Contraction Expansion Straight Channels

Mustafa Yilmaz, Istanbul Technical University, Turkey
Meral Cengiz, Istanbul Technical University, Turkey
Huseyin Kizil, Istanbul Technical University, Turkey
Arzu Ozbey, Istanbul Technical University, Turkey
Levent Trabzon, Istanbul Technical University, Turkey

Microfluidic gate - Utilization of Self-Assembling, Free-Flowing Superstructures of Superparamagnetic Beads for Enhanced Mixing and Colloidal Separation

Bernhard Eickenberg, University of Bielefeld, Germany
Frank Wittbracht, University of Bielefeld, Germany
Andreas Hütten, University of Bielefeld, Germany
Alexander Weddemann, Massachusetts Institute of Technology, USA

Rotating magnetic field assisted formation of highly ordered two-dimensional magnetic bead arrays

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Bernhard Eickenberg, Department of Physics, Thin Films and Physics of Nanostructures, Bielefeld University, Germany
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Andreas Hütten, Department of Physics, Thin Films and Physics of Nanostructures, Bielefeld University, Germany

Microfluidics Blood Separations through Optical Sorting and Deterministic Lateral Displacement

Alexander Zhbanov, Gwangju Institute of Science and Technology (GIST), Republic of Korea
Sung Yang, Gwangju Institute of Science and Technology (GIST), Republic of Korea
PVC Inorganic Hybrids Based on Kaolinite/Urea Intercalates

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Vlastimil Matejka, Department of Nanotechnology Centre, VSB-Technical University of Ostrava, Czech Republic
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Jiri Malac, Centre of Polymer Systems, Department of polymer Engineering, Faculty of Technology, Tomas Bata University in Zlin, Czech Republic
Diederik Aerts
  Quantum Interaction Approach in Cognition, Artificial Intelligence and Robotics
  Quantum Structure in Cognition: Fundamentals and Applications

Rossi Alessandro
  Quantum Computing with Charge States in Silicon: Towards a Leadless Approach

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Sahar Daraeizadeh
  Reduced Hamiltonian Technique for Gate Design in Strongly Coupled Quantum Systems
Bernhard Eickenberg
  Microfluidic gate - Utilization of Self-Assembling, Free-Flowing Superstructures of Superparamagnetic Beads for Enhanced Mixing and Colloidal Separation
  Rotating magnetic field assisted formation of highly ordered two-dimensional magnetic bead arrays

Thierry Ferrus
  Quantum Computing with Charge States in Silicon : Towards a Leadless Approach

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  Quantum Structure in Cognition: Fundamentals and Applications

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