



*This workshop
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The NATO Science for Peace
and Security Programme

Programme of NATO Advanced Research Workshop “Functional Nanomaterials and Devices for Electronics, Sensors, Energy Harvesting

Day of arrival (13 April)

18⁰⁰ Welcome party

First day (14 April)

8⁴⁵ Opening ceremony

Low-Power electronics: from More Moore to More than Moore

9⁰⁰ (Invited) Advantages and challenges of nanoscale MOSFETs for analog and RF

V. Kilchytska, S. Makovejev, B. Kazemi Esfeh, J.-P. Raskin, D. Flandre
ICTEAM Institute, Université catholique de Louvain, Louvain-la-Neuve, Belgium

9³⁰ (Invited) Electrical characterization and parameter extraction of junctionless nanowire devices

T. Rudenko¹, S. Barraud², K. Cherkaoui³, Y. Georgiev³, and A. Nazarov¹
¹*Institute of Semiconductor Physics, NASU, Prospect Nauki 45, 03028 Kyiv, Ukraine*
²*CEA-LETI, MINATEC Campus, 17 rue des Martyrs, 38054 Grenoble, Cedex 9, France*
³*Tyndall National Institute, University College Cork Lee Maltings, Prospect Row, Cork 30, Ireland*

10⁰⁰ Low subthreshold slope and impact ionization in multigate junctionless MOSFETs

A. Nazarov¹, R. Yu², Y. Georgiev², R. Duffy²
¹*Institute of Semiconductor Physics, NASU, Kyiv, Ukraine*
²*Tyndall National Institute, University College Cork, Ireland*

10¹⁵ (Invited) Steep-slope devices: prospects and challenges

E. Gnani, P. Maiorano, E. Baravelli, A. Gnudi, S. Reggiani, G. Baccarani
DEI and ARCES, University of Bologna, Italy

10⁴⁵ Coffee break

Nanostructures and devices: Steep Slope devices

11¹⁵ (Invited) Tunneling Field Effect Transistors for Low Power Electronics

S. Mantl, L. Knoll, S. Richter, G. V. Luong, S. Blaeser, S. Wirths, Ch. Schulte-Braucks, S. Trelenkamp, D. Buca, Q.-T. Zhao
JARA-FIT, Forschungszentrum Jülich, Jülich, Germany

11⁴⁵ (Invited) Trends and Challenges in Tunnel Field Effect Transistors

A. Vandooren, R. Rooyackers, A. Alian, A.S. Verhulst, D. Verreck, Q. Smets, A. Mocuta, N. Collaert, A.V.Y Thean
IMEC, Leuven, Belgium

12¹⁵ **(Invited) Hybrid CMOS/TFET circuits – Challenges and Perspectives**

C. Anghel

Institut Supérieur d'Electronique de Paris, France

13⁰⁰ Lunch

MEMS and structures for sensors and biomedicine

14⁰⁰ **(Invited) Atomic-layer deposited Al₂O₃/CMOS capacitive biosensors for detection of bacterial cells in solution**

N. Couniot, L. Francis, **D. Flandre**

ICTEAM Institute, Université catholique de Louvain, Louvain-la-Neuve, Belgium

14³⁰ **(Invited) Low power nanosensors for environmental and physiological wearable systems**

H. Guerin, A. M. Ionescu

Nanolab, Swiss Federal Institute of Technology, Switzerland

15⁰⁰ **(Invited) Selected questions related to characterization of MEMS structures comprising PZT piezo layer**

J. Zając, T. Gutt and P. Grabiec

Instytut Technologii Elektronowej, Warsaw, Poland

15³⁰ **(Invited) Morphology of the interface silicon wire – nervous fiber**

A. Klimovskaya¹, A. Korsak², N. Vysotskaya¹, V. Lykhodiyevski², Yu. Chaikovski², I. Ostrovskii³

¹*Institute of Semiconductor Physics, NAS of Ukraine, Kyiv, Ukraine*

²*Bogomolets National Medical University, Kyiv, Ukraine*

³*National University “Lvivska Polytechnika”, Lviv, Ukraine*

15⁵⁵ **Rapid genetic detection of avian influenza in lab-chip for gel electrophoresis**

W. Kubicki¹, R. Walczak¹, K. Kucharczyk², J. A. Dziuban¹

¹*Wroclaw University of Technology, Wroclaw, Poland*

²*Biovectis, Warsaw, Poland*

16¹⁰ Coffee break

Memory devices and spintronics

16³⁰ **(Invited) HfO₂ Based OxRAM: the next non-volatile memories for novel low power applications**

J.-F. Nodin, T. Cabout, E. Vianello, L. Perniola

LETI, Grenoble, France

17⁰⁰ **(Invited) FePt thin films – prospective materials for ultrahigh density magnetic recording**

I.A. Vladymyrskiy, S.I. Sidorenko, Iu.M. Makogon

Metal Physics Department, National Technical University of Ukraine “KPI”, Kyiv, Ukraine

17³⁰ **Optical and electron-beam recording of surface relief’s using Ge₅As₃₇S₅₈–Se nanomultilayers as registering media**

A. Stronski¹, E. Achimova², O. Paiuk¹, **A. Meshalkin**², V. Abashkin², O. Lytvyn¹, S. Sergeev², A. Prisacar², P. Oleksenko¹, G. Triduh²

¹*Institute of Semiconductor Physics NAS of Ukraine, Kyiv, Ukraine*

²*Institute of Applied Physics AS of Moldova, Chisinau, Moldova*

17⁴⁵ **(Invited) Silicon Spintronics**

V. Sverdlov, J. Ghosh, A. Makarov, T. Windbacher, and S. Selberherr

Institute for Microelectronics, TU Wien, Wien, Austria

18¹⁵ **Magnetic Properties of Doped Si<B,Ni> Whiskers for Spintronics**

A. Druzhinin^{1,2}, I. Ostrovskii^{1,2}, Yu. Khoverko^{1,2}, K. Rogacki², S. Yatsukhnenko¹

¹*Lviv National Polytechnical University, Lviv, Ukraine*

18³⁰ Break

19³⁰ Poster Session & Buffet

Second day (15 April)

Functional nanomaterials and structures

9⁰⁰ **(Invited) Zinc oxide based transparent electronics.**

S. Hall¹, J. Jin¹, A. Shaw¹, I.Z Mitrovic¹, J. Wrench², P.R Chalker²

¹Department of Electrical Engineering & Electronics

²Centre for Advanced Materials, University of Liverpool, United Kingdom

9³⁰ **(Invited) Subsecond thermal processing for nanomaterials and beyond**

W. Skorupa

Institute of Ion Beam Physics and Materials Research, Helmholtz Zentrum Dresden-Rossendorf, Dresden, Saxony, Germany

10⁰⁰ **(Invited) Hexagonal OsB₂: Mechanochemical synthesis, spark plasma sintering, structure, thermal stability and mechanical properties**

Zh. Xie¹, R. Blair^{1,2}, **N. Orlovskaya¹**, M. Radovic³, D. Cullen⁴, A. Payzant⁵

¹Department of Mechanical and Aerospace Engineering, University of Central Florida, Orlando, USA

²Department of Physics, University of Central Florida, Orlando, USA

³Department of Materials Science and Engineering, Texas A&M University, College station, USA

⁴Materials Science & Technology Division, Oak Ridge National Laboratory, Oak Ridge, USA

⁵Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, USA

10³⁰ Coffee break

Functional nanomaterials and structures

11⁰⁰ **(Invited) Millisecond range liquid phase processing of nanowire structures**

S. Prucnal

Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

11³⁰ **(Invited) Exploring organic thin film growth on modified TiO₂**

M. Kratzer¹, D. Wrana², K. Szajna², F. Krok², Ch. Teichert¹

¹Institute of Physics, Montanuniversitaet Leoben, Leoben, Austria

²Institute of Physics, Jagiellonian University, Krakow, Poland

12⁰⁰ **(Invited) Functional nanocomposites based on porous silicon filled with metals**

K. Girel¹, H. Bandarenka¹, A. Dolgyi¹, S. Redko¹, S. Prischepa¹, V. Malishev², V. Tsybulskyi²,

V. Bondarenko¹

¹Belarussian State University of Informatics & Radioelectronics, Minsk, Belarus

²Scientific Practical Centre "Belmicrosystems", Minsk, Belarus

12³⁰ Lunch

MEMS and structures for sensors

13³⁰ **(Invited) ZnO SAW and FBAR Technologies for Lab-on-a-chip Applications**

W.I. Milne

Engineering Department, University of Cambridge., UK

14⁰⁰ **MEMS high dose radiation sensor**

I. Augustyniak, P. Knapkiewicz, K. Sareło, J. A. Dziuban

Faculty of Microsystem Electronics and Photonics, Wroclaw University of Technology, Wroclaw, Poland

14¹⁵ **Novel sonochemical route for manufacturing O₂ sensitive STFO**

A. Stratulat¹, **B. Serban**¹, C. Cobianu¹, V. Avramescu¹, M. Brezeanu¹, O. Buiu¹, L. Diamandescu², M. Feder², F. Udrea^{3,4}, A. De Luca³, S.Z. Ali⁴

¹Honeywell Romania SRL, Sensors and Wireless Laboratory Bucharest (SWLB), Bucharest, Romania

²National Institute of Materials Physics, Bucharest, Romania

³University of Cambridge, Centre for Advanced Photonics and Electronics, Cambridge, UK

⁴Cambridge CMOS Sensors, Cambridge, UK

14³⁰ **Development and modeling of thermal energy harvesting setup**

K.Domański, P.Prokaryn, **D.Tomaszewski**, M.Marchewka, P.Grabiec

Instytut Technologii Elektronowej (ITE), Warsaw, Poland

15⁰⁰ **Free time**

19⁰⁰ **Banquet**

Third Day (16 April)

Graphene nanoelectronics

9⁰⁰ **(Invited) CVD grown Graphene for Opto-Electronic Applications**

V. Passi, A. Gahoi, S. Riazimehr, S. Wagner, A. Bablich, S. Kataria, M.C. Lemme

University of Siegen, School of Science and Technology, Graphene-based Nanotechnology, Siegen, Germany

9³⁰ **(Invited) Exploring the growth of organic semiconductors on various graphene substrates for device applications**

C. Teichert¹, M. Kratzer¹, G. Hlawacek^{1,2}, A. Nevesad¹, C. Ganser¹, S. Klima¹, F. Khokhar², R. van Gastl², B. Poelsema², H. Zandvliet², B. Vasić³, A. Matković³, U. Ralević³, R. Gajić³, B. C. Bayer^{4,5}, P. R. Kidambi⁴, A. Cabrero-Vilatela⁴, Robert S. Weatherup⁴, S. Hofmann⁴

¹*Institute of Physics, Montanuniversität Leoben, Leoben, Austria*

²*Physics of Interfaces and Nanomaterials, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands*

³*Institute of Physics, University of Belgrade, Belgrade, Serbia*

⁴*Department of Engineering, University of Cambridge, Cambridge, UK*

⁵*Faculty of Physics, University of Vienna, Vienna, Austria*

10⁰⁰ **Graphene growth, transfer and devices fabrication**

B. Huet, P.-A. Hadda, M. Hammad, J.-P.e Raskin

ICTEAM, Université catholique de Louvain, Louvain-la-Neuve, Belgium

10¹⁵ **Carbon nanostructures formed by the γ radiation of the graphene layers fabricated from the Ni/a-SiC solid carbon source**

A.N. Nazarov¹, A.V. Vasin¹, P.M. Lytvyn¹, A.S. Nikolenko¹, V.V. Strelchuk¹, Yu.Yu. Gomeniuk¹, **S.I.Tyagulskiy**¹, A.V. Rusavsky¹, V.N. Poroshin², V.Yu. Povarchuk², V.S. Lysenko¹

¹*Lashkaryov's Institute of Semiconductor Physics, NAS of Ukraine, Kyiv, Ukraine*

²*Institute of Physics, NAS of Ukraine, Kyiv, Ukraine*

10³⁰ **Coffee break**

Light Emission nanostructured materials and devices

11⁰⁰ **(Invited) Less Material, More Energy: Novel Nanostructured Luminescent Materials**

C. Wickleder

Inorganic Chemistry, Faculty for Science and Technology, University of Siegen, Germany

11³⁰ **(Invited) High luminescent silicon-oxycarbide materials and nanostructures: Progresses and challenges**

V. Nikas, B. Ford, N. Tabassum, M. Huang, A. E. Kaloyeros, **S. Gallis**
College of Nanoscale Sciences and Engineering, State University of New York Polytechnic Institute, Albany, New York, USA

12⁰⁰ **(Invited) Near UV-VIS photoluminescence in nanostructured silica and alumina**

A.V. Vasin¹, V.A. Tyortyh², Y.M. Bolbukh², Yu.P. Piryatinsky³, C. Wickleder⁴, M. Adlung⁴, D.V. Kisel⁵, A.N. Nazarov¹, V.S. Lysenko¹

¹*Lashkaryov Institute of Semiconductor Physics NASU, Kyiv, Ukraine*

²*Institute of Surface Chemistry NASU, Kyiv, Ukraine*

³*Institute of Physics NASU, Kyiv, Ukraine*

⁴*University of Siegen, Siegen, Germany*

⁵*National Technical University of Ukraine "KPI", Kyiv, Ukraine*

13⁰⁰ **Lunch**

Functional nanomaterials and structures and their diagnostics

14⁰⁰ **(Invited) Photoelectric phenomena and photoelectric characterization methods of the MOS system. Basics and new developments**

H.M. Przewlocki

Institute of Electron Technology, Warsaw, Poland

14³⁰ **Diagnostics of Interfacial Interactions in Polymer-based Nanocomposites**

G. Yu. Rudko¹, A.O. Kovalchuk¹, V. I. Fediv², W. M. Chen³, **I. A. Buyanova**³

¹*V. Lashkaryov Institute of Semiconductor Physics, NAS of Ukraine, Kiev, Ukraine*

²*Department of Biophysics and Medical Informatics, Bukovinian State Medical University, Chernivtsi, Ukraine*

³*Department of Physics, Chemistry and Biology, Linköping University, Linköping, Sweden*

14⁴⁵ **Local charge trapping and recombination in Ge nanoclusters**

S.V. Kondratenko¹, V.S. Lysenko², Yu.N. Kozyrev³, M. Kratzer⁴, D.P. Storozhuk¹, S.A. Iliash¹, C. Czibula⁴ and C. Teichert⁴

¹*Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*

²*Institute of Semiconductor Physics, Kyiv, Ukraine*

³*O.O. Chuiko Institute of Surface Chemistry, Kyiv, Ukraine*

⁴*Institute of Physics, Montanuniversität Leoben, Leoben, Austria*

15⁰⁰ **Physical insights on charge transport mechanism and the LF noise behavior in oxidized Si structures with Ge nanoclusters**

V. Lysenko¹, Y. Gomeniuk¹, **V. Kudina**¹, N. Garbar¹, S. Kondratenko², Y. Kozyrev³

¹*Institute of Semiconductor Physics, NAS of Ukraine, Kyiv, Ukraine*

²*National Taras Shevchenko University, Physics Department, Kyiv, Ukraine*

³*Chuiko Institute of Surface Chemistry, NAS of Ukraine, Kyiv, Ukraine*

15¹⁵ **Synthesis, morphology control of the "green" silver nanoparticles in situ of mesoscopic ordering in the mesostructured composite films**

G. Telbiz¹, E. Leonenko¹, V. Grebennikov¹, A. Stronski², **T. Kukhtareva**³, P. Manoryk¹

¹*Institute of Physical Chemistry NASU, Kyiv, Ukraine;*

²*Institute of Semiconductor Physics, NAS of Ukraine, Kyiv, Ukraine,*

³*Alabama A&M University, Normal, Alabama, USA*

15³⁰ **Coffee break**

16³⁰ **Closing remarks: Future routes for East-West partnership and scientific collaborations**