



## Hasselt Diamond Workshop 2024

### SBDD XXVIII



## February 28 – March 1, 2024

### cultuurcentrum Hasselt (Cultural Centre), Hasselt, Belgium

During three full days, SBDD XXVIII will address recent progress in a variety of topics ranging from fundamental material science to applications, focusing on CVD diamond.

### Tuesday, February 27, 2024

18:00 – 19:00 Registration at the *Express by Holiday Inn*.

### Wednesday, February 28, 2024

08:20 – 08:50 Registration at the *cultuurcentrum Hasselt*.

08:50 – 09:00 Opening "*Hasselt Diamond Workshop 2024 – SBDD XXVIII*".

#### Session 1

#### Diamond Device Technology

Chair: **Ken Haenen, Hasselt University & IMEC vzw, Belgium**

#### 09:00

1.1 (Invited)

#### Diamond thermal impact on the technology development beyond Moore's law

M. Malakoutian

*Electrical Engineering Department, Stanford University, 420 Via Palou Mall, Stanford, CA, USA*

#### 9:30

1.2

#### Heteroepitaxial Diamond for Integration with GaN-Devices

V. Lebedev<sup>1</sup>, J. Weippert<sup>1</sup>, T. Fehrenbach<sup>2</sup>, S. Leone<sup>1</sup>, J. Kustermann<sup>1</sup>, J. Engels<sup>1</sup>, L. Kirste<sup>1</sup>, M. Ohnemus<sup>2</sup>, C. Wild<sup>2</sup>, and P. Knittel<sup>1</sup>

<sup>1</sup>Fraunhofer IAF, Fraunhofer Institute for Applied Solid State Physics, 79108 Freiburg, Germany. <sup>2</sup>Diamond Materials GmbH, 79108 Freiburg, Germany.

#### 9:50

1.3

#### Diamond etching mechanism using an electron beam

D.D.Tran<sup>1,2,3</sup>, F.Donatini<sup>1</sup>, C.Mannequin<sup>3,4</sup>, M.Regnier<sup>1,2,3</sup>, E.Gheeraert<sup>1,2,3</sup>

<sup>1</sup>Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Neel, 38000 Grenoble, France. <sup>2</sup>Institute of Applied Physics, Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba 305-8573, Japan. <sup>3</sup>Japanese-French Laboratory for Semiconductor physics and Technology J-FAST, CNRS, Université Grenoble Alpes, Grenoble INP, University of Tsukuba, Japan. <sup>4</sup>CNRS-Nantes Université-Institut des Matériaux de Nantes Jean Rouxel.

10:10 Coffee Break (Grand Banquet Hall)

## Session 2

### Diamond Quantum Technology

Chair: **Christoph Becher, Universität des Saarlandes, Germany**

**10:50**

2.1 (Invited)

#### Creating controlled NV systems in (001) and (111) diamond for quantum technologies

Lillian B. Hughes<sup>1</sup>, Simon A. Meynell<sup>2</sup>, Weijie Wu<sup>3</sup>, Shreyas Parthasarathy<sup>2</sup>, Emily J. Davis<sup>3</sup>, Zilin Wang<sup>3</sup>, Eveline Postelnicu<sup>4</sup>, Kunal Mukherjee<sup>4</sup>, Norman Y. Yao<sup>3</sup>, Ania C. B. Jayich<sup>2</sup>

<sup>1</sup>Materials Department, University of California, Santa Barbara, CA 93106, USA. <sup>2</sup>Department of Physics, University of California, Santa Barbara, CA 93106, USA. <sup>3</sup>Department of Physics, Harvard University, Cambridge, MA 02138, USA. <sup>4</sup>Department of Materials Science and Engineering, Stanford University, Palo Alto, CA 94305, USA.

**11:20**

2.2

#### Investigating Spin Impurities in Diamond for Enhanced Quantum Sensors

Olga R. Rubinas<sup>1,2,3</sup>, Vladimir V. Soshenko<sup>1</sup>, Stepan V. Bolshedvorskii<sup>1</sup>, Ivan S. Cojocaru<sup>1</sup>, Victor G.

Vins<sup>4</sup>, Andrey N. Smolyaninov<sup>1</sup>, Vadim N. Sorokin<sup>1</sup>, Alexey V. Akimov<sup>1</sup>

<sup>1</sup>P.N. Lebedev Physical Institute of the RAS, Moscow, Russia, <sup>2</sup>IMOMEC, imec, Kapeldreef 75, Heverlee, B-3001 Belgium. <sup>3</sup>Institute for Materials Research (IMO), Hasselt University, Wetenschapspark 1, Diepenbeek, B-3590 Belgium, <sup>4</sup>LLC Velman, Novosibirsk, Russia.

**11:40**

2.3

#### CW laser activation of color centers in diamond

E. Nieto Hernández<sup>1,2</sup>, V. Pugliese<sup>1,2</sup>, E. Corte<sup>1,2</sup>, S. Ditalia Tchernij<sup>1,2</sup>, P. Olivero<sup>1,2</sup>, J. Forneris<sup>1,2</sup>

<sup>1</sup>Department of Physics, University of Torino, Italy. <sup>2</sup>Istituto Nazionale di Fisica Nucleare (INFN), sezione di Torino, Torino, Italy.

**12:00**

2.4

#### Silicon vacancy centres in diamond nanostructures for quantum sensing

M. Li<sup>1</sup>, J.A. Zuber<sup>1,2</sup>, Z.H. Zhang<sup>3</sup>, M. Grimau<sup>1</sup>, J. Happacher<sup>1</sup>, P. Reiser<sup>1</sup>, B. Shields<sup>1</sup>, M. Batzer<sup>1</sup>, N.P. de Leon<sup>3</sup>, P. Maletinsky<sup>1,2</sup>

<sup>1</sup>Department of Physics, University of Basel, CH-4056 Basel, Switzerland. <sup>2</sup>Swiss Nanoscience Institute, University of Basel, CH-4056 Basel, Switzerland. <sup>3</sup>Department of Electrical and Computer Engineering, Princeton University, Princeton, New Jersey 08544, USA.

**12:30 SBDD XXVIII group photo (Lecture Hall)**

**12:40 Lunch (Grand Banquet Hall)**

## Session 3

### Quantum Sensing I

Chair: **Quan Li, The Chinese University of Hong Kong, Hong Kong**

**14:20**

3.1 (Invited)

#### Nanoscale magnetic resonance with an optimal sensitivity spin sensor in diamond

Fazhan Shi

CAS Key Laboratory of Microscale Magnetic Resonance and Department of Modern Physics, University of Science and Technology of China, Hefei 230026, China.

**14:50**

3.2

#### The role of electrolytes in the relaxation of near-surface spin defects in diamond

Fabian A. Freire-Moschovitis<sup>1</sup>, Roberto Rizzato<sup>1</sup>, Anton Pershin<sup>2</sup>, Moritz R. Schepp<sup>1</sup>, Robin D. Allert<sup>1</sup>, Lina M. Todenhagen<sup>1</sup>, Martin S. Brandt<sup>1</sup>, Ádám Gali<sup>2</sup>, and Dominik B. Bucher<sup>1</sup>

<sup>1</sup>TUM School of Natural Sciences, Technical University of Munich, 85748 Garching, Germany. <sup>2</sup>Institute for Solid State Physics and Optics, Wigner Research Centre for Physics, Budapest H-1525, Hungary.

15:10

3.3

### Photovoltage imaging and magnetic resonance detection of single nitrogen- vacancy centers in diamond

Sergei Trofimov<sup>1</sup>, Klaus Lips<sup>1</sup> and Boris Naydenov<sup>1</sup>

<sup>1</sup>Berlin Joint EPR Laboratory and Department Spins in Energy Conversion and Quantum Information Science (ASPIN), Hahn-Meitner-Platz 1, Berlin, Germany.

15:30

3.4

### Heteroepitaxial CVD diamond quantum sensors for electric vehicle battery current monitor

Yuji Hatano<sup>1</sup>, Kenichi Kajiyama<sup>1</sup>, Moriyoshi Haruyama<sup>2</sup>, Yuta Kainuma<sup>1</sup>, Hiromitsu Kato<sup>2</sup>, Masahiko Ogura<sup>2</sup>, Toshiharu Makino<sup>2</sup>, Hitoshi Noguchi<sup>3</sup>, Hiroshi Abe<sup>4</sup>, Shinobu Onoda<sup>4</sup>, Takeshi Ohshima<sup>4</sup>, Takayuki Iwasaki<sup>1</sup>, Mutsuko Hatano<sup>1,4</sup> <sup>1</sup>Tokyo Institute of Technology, Meguro-ku, Tokyo 152-8552, Japan. <sup>2</sup>National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki 305-8568, Japan. <sup>3</sup>Shin-Etsu Chemical Co., Ltd., Gunma 379-0224, Japan. <sup>4</sup>National Institutes for Quantum Science and Technology (QST), Takasaki, Gunma 370-1292, Japan.

15:50 Coffee Break (Grand Banquet Hall)

## Session 4

### Diamond Devices I

Chair: Jan Isberg, Uppsala University, Sweden

16:30

4.1 (Invited)

### n-Channel diamond MOSFET formation and related CVD technologies

Satoshi Koizumi

National Institute for Materials Science, 1-1 Namiki, Tsukuba 305-0044, Japan

17:00

4.2

### First interdigitated diamond FET toward industrial power electronic

Damien Michez<sup>1,2</sup>, Juliette Letellier<sup>1</sup>, Marine COURET<sup>2</sup>, Julien Pernot<sup>3</sup> and Nicolas Rouger<sup>2</sup>

<sup>1</sup>DIAMFAB, 25 avenue des Martyrs, 38042 Grenoble, France. <sup>2</sup>LAPLACE, Univ. Toulouse III Paul Sabatier, 2 rue Charles Camichel, 31071 Toulouse, France. <sup>3</sup>Institut Néel, Univ. Grenoble Alpes, CNRS, Grenoble INP, 38000 Grenoble, France.

17:20

4.3

### Accumulation Channel H-diamond FETs with extreme Enhancement-Mode operation (< -6V Vgs) and high on-state current

Chunlin Qu<sup>1</sup>, Isha Maini<sup>1</sup>, Qing Guo<sup>1</sup>, Alastair Stacey<sup>2</sup>, David A. J. Moran<sup>1</sup>

<sup>1</sup>James Watt School of Engineering, University of Glasgow, Glasgow, UK. <sup>2</sup>Princeton Plasma Physics Laboratory, Princeton University, Princeton, NJ, USA.

17:40

4.4

### Improvement of device variation in inversion channel diamond MOSFETs by buried p+-layer for source and drain

Kai Sato<sup>1</sup>, Tsubasa Yoshimoto<sup>1</sup>, Hiromitsu Kato<sup>3</sup>, Toshiharu Makino<sup>3</sup>, Masahiko Ogura<sup>3</sup>, Daisuke Takeuchi<sup>3</sup>, Kimiyoshi Ichikawa<sup>1</sup>, Kan Hayashi<sup>1,2</sup>, Takao Inokuma<sup>1</sup>, Satoshi Yamasaki<sup>1</sup>, Norio Tokuda<sup>1,2</sup>, Tsubasa Matsumoto<sup>1,2</sup>

<sup>1</sup>Nanomaterials Research Institute, Kanazawa University, Kakuma-machi, Kanazawa, Japan. <sup>2</sup>Graduate School of Natural Science and Technology, Kanazawa University, Kakuma-machi, Kanazawa, Japan. <sup>3</sup>Advanced Power Electronics Research Center, AIST, 1-1-1 Umezono, Tsukuba, Japan.

## Session 5

Posters I & Reception sponsored by:  SEKI DIAMOND

Chairs: Jocelyn Achard, Université Sorbonne Paris Nord, France; Shery L.Y. Chang, University of New South Wales, Australia; Anke Krueger, Universität Stuttgart, Germany; Boris Naydenov, Helmholtz-Zentrum Berlin (HZB), Germany

18:00 – 20:00 (Grand & Small Banquet Hall)

5.1

### Quantum defect fabrication in diamond utilizing a 515 nm femtosecond laser

João P. Silva<sup>1,2,3</sup>, João M. Maia<sup>2,3</sup>, Filipe Camarinho<sup>1</sup>, Paulo V.S. Marques<sup>2,3</sup>, Jana B. Nieder<sup>1</sup>

<sup>1</sup>INL - International Iberian Nanotechnology Laboratory, Ultrafast Bio- and Nanophotonics group, Av. Mestre

José Veiga s/n, Braga, Portugal. <sup>2</sup>INESC TEC, CAP – Centre for Applied Photonics, Rua do Campo Alegre 687, Porto, Portugal.

<sup>3</sup>Department of Physics and Astronomy, Faculty of Sciences, University of Porto, Rua Campo Alegre 687, Porto, Portugal.

5.2

### NIR defects in electronic grade CVD diamond from photocurrent spectroscopy

Remy Vandebosch<sup>1,3</sup>, Zdenek Remes<sup>2</sup>, Emilie Bourgeois<sup>1,3</sup>, Jaroslav Hruby<sup>1,3</sup>, Boo Carmans<sup>1</sup>, Milos Nesladek<sup>1,3</sup>

<sup>1</sup>Institute for Materials research (IMO), Hasselt University, Wetenschapspark 1, Diepenbeek, Belgium. <sup>2</sup>Institute of Physics of the

Czech Academy of Sciences, Na Slovance 2, Prague, Czechia. <sup>3</sup>Imomec division IMEC, Wetenschapspark 1, Diepenbeek, Belgium.

5.3

### Transient Absorption Spectroscopy of Carbon Vacancies in Diamond: Electronic Structure and Dynamics

Minh-Tuan Luu<sup>1</sup>, Ali Tayefeh Younesi<sup>1</sup>, Ronald Ulbricht<sup>1</sup>

<sup>1</sup>Max-Planck-Institut für Polymerforschung, Ackermannweg 10, 55128 Mainz

5.4

### Investigation of oxygen-vacancy complexes in diamond by means of ab initio calculations

Nima Ghafari Cherati<sup>1,2</sup>, Gergő Thiering<sup>1</sup>, Adam Gali<sup>1,2</sup>

<sup>1</sup>Wigner Research Centre for Physics, PO Box 49, H-1525 Budapest, Hungary <sup>2</sup>Department of Atomic Physics, Budapest University of Technology and Economics, Budapest, Hungary

5.5

### The impact of strain on GeV color centers in diamond.

Thijs van Wijk<sup>1,2</sup>, E. Aylin Melan<sup>1,2</sup>, Emerick Y. Guillaume<sup>1,2</sup>, Danny E. P. Vanpoucke<sup>1,2</sup>

<sup>1</sup>QuATOMs, Hasselt University, Agoralaan Gebouw D, 3590 Diepenbeek, Belgium. <sup>2</sup>Institute for Materials Research (IMO), IMOMECE, IMEC vzw, Diepenbeek, Belgium.

5.6

### Impact of annealing conditions on optical properties of GeV centers produced via ion implantation

Lev Kazak<sup>1</sup>, Francesco Maruca<sup>1,2</sup>, Katharina Senkalla<sup>1</sup>, Stefan Dietel<sup>1</sup>, Varvara Foteinou<sup>3</sup>, Jens Fuhrmann<sup>1</sup>, Petr Siyushev<sup>1,4</sup>, Roberto Osellame<sup>2,5</sup>, Fedor Jelezko<sup>1</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, Albert-Einstein-Allee 11, 89081 Ulm, Germany. <sup>2</sup>Dipartimento di Fisica, Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milano, Italy. <sup>3</sup>RUBION, Ruhr-Universität Bochum, Universitätstrasse 150, 44780 Bochum, Germany. <sup>4</sup>Institute for Material Research (IMO), Hasselt University, Wetenschapspark 1, B-3590 Diepenbeek, Belgium. <sup>5</sup>Istituto di Fotonica e Nanotecnologie, CNR, Piazza Leonardo da Vinci 32, 20133 Milano, Italy.

5.7

### MeV carbon implantation in N-rich single crystal CVD diamond

Matija Matijević<sup>1,2</sup>, Zdravko Siketić<sup>1</sup>, Jacopo Forneris<sup>2</sup>, Elena Nieto Hernandez<sup>2</sup>, Emilio Corte<sup>2</sup>

<sup>1</sup>Ruđer Bošković Institute, Bijenička cesta 54, 10000 Zagreb, Croatia. <sup>2</sup>Department of Physics, University of Turin, Via Pietro Giuria 1, 10125 Turin, Italy.

5.8

### Development of focused MeV ion beam implantation system for fabrication of colour centres in diamond with single ion detection capability

Andreo Crnjac<sup>1</sup>, Arnold Müller<sup>1</sup>, Christof Vockenhuber<sup>1</sup>, Enrico Sangregorio<sup>2</sup>, Massimo Camarda<sup>3</sup>

<sup>1</sup>Laboratory of Ion Beam Physics, ETH Zurich, Zurich, Switzerland. <sup>2</sup>Department of Physics and Astronomy, University of Catania, Catania, Italy. <sup>3</sup>SenSiC GmbH, Villigen, Switzerland

5.9

#### **Hot ion implantation for creating dense NV ensemble near the diamond surface**

Midrel Wilfried Ngandeu Ngambou<sup>1</sup>, Pauline Perrin<sup>2</sup>, Alexandre Tallaire<sup>1,2</sup>, Ovidiu Brinza<sup>1</sup>, Vianney Mille<sup>1</sup>, Audrey Valentin<sup>1</sup>, Fabien Bénédic<sup>1</sup>, Philippe Goldner<sup>2</sup>, Jocelyn Achar<sup>1</sup>

<sup>1</sup>LSPM, CNRS, Université Sorbonne Paris Nord, 99 Avenue JB clément 93430, Villetaneuse, France. <sup>2</sup>IRCP, Chimie ParisTech, CNRS, PSL Research University, 11 rue Pierre et Marie Curie, 75005 Paris, France.

5.10

#### **Formation mechanism of PbV centers from implanted Pb in diamond**

Ulrich Wahl<sup>1</sup>, João G. Correia<sup>1</sup>, Ângelo Costa<sup>1</sup>, Brecht Biesmans<sup>2</sup>, Kirill Danilov<sup>2</sup>, S. Malven Tunhuma<sup>2</sup>, Afonso Lamelas<sup>3</sup>, Vítor Amaral<sup>3</sup>, Karl Johnston<sup>4</sup>, André Vantomme<sup>2</sup>, Lino Pereira<sup>2</sup>

<sup>1</sup>Centro de Ciências e Tecnologias Nucleares (C2TN), Departamento de Engenharia e Ciências Nucleares (DECN), Instituto Superior Técnico, Universidade de Lisboa, 2695-066 Bobadela LRS, Portugal. <sup>2</sup>KU Leuven, Quantum Solid-State Physics, 3001 Leuven, Belgium. <sup>3</sup>CICECO- Instituto de Materiais de Aveiro, Universidade de Aveiro, 3810-193 Aveiro, Portugal. <sup>4</sup>CERN-EP, 1211 Geneva 23, Switzerland.

5.11

#### **Influence of Surface Termination on Near-surface NV-doped Diamond Thin Films**

Rebeka Eberle, Philip Schätzle, Riccardo Bellese, Patrik Straňák, Peter Knittel

Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, Freiburg, Germany.

5.12

#### **Influence of diamond oxygen termination on shallow NV centers**

Jens Fuhrmann<sup>1</sup>, Johannes Lang<sup>1,2</sup>, Jochen Scharpf<sup>3</sup>, Thomas Unden<sup>3</sup>, Joachim Bansmann<sup>4</sup>, Thorsten Bernhardt<sup>4</sup>, Philipp Neumann<sup>3</sup> and Fedor Jelezko<sup>1,5</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, Albert -Einstein-Allee 11, Ulm 89081, Germany. <sup>2</sup>Diatope GmbH, Buchenweg 23, Ummendorf 88444, Germany. <sup>3</sup>NVision Imaging Technologies GmbH, Albert -Einstein-Allee 11, Ulm 89081, Germany. <sup>4</sup>Institute for Surface Chemistry and Catalysis, Ulm University, Albert -Einstein-Allee 11, Ulm 89081, Germany. <sup>5</sup>Integrated Quantum Science and Technology (IQST), Ulm University, Albert -Einstein-Allee 11, Ulm 89081, Germany.

5.13

#### **Shallow NV- colour centres in diamond**

Elena Missale<sup>1</sup>, Rossana Dell'Anna<sup>1</sup>, Damiano Giubertoni<sup>1</sup>, Antonino Picciotto<sup>1,2</sup>, Alina Samusenko<sup>1</sup>, Danny Zanardo<sup>1</sup>, Giorgio Speranza<sup>1,2,3</sup>

<sup>1</sup>Fondazione Bruno Kessler, v. Sommarive 18, 38123 Trento, Italy. <sup>2</sup>Department of Industrial Engineering, University of Trento, v. Sommarive 9, 38123 Trento, Italy. <sup>3</sup>IFN - CNR, CSMFO Lab., via alla Cascata 56/C, 38123 Trento, Italy.

5.14

#### **Optimizing nitrogen-vacancy center formation during CVD diamond growth**

Karolina Schüle<sup>1</sup>, Allegra De Gleria Clark<sup>1,2</sup>, Christoph Findler<sup>1,3</sup>, Oliver Schmid<sup>1</sup>, Fedor Jelezko<sup>1,4</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, Albert-Einstein-Allee 11, D-89081 Ulm, Germany. <sup>2</sup>Department of Materials Science and Engineering, Monash University, 14 Alliance Lane, Clayton, Victoria 3800, Australia. <sup>3</sup>Diatope GmbH, Buchenweg 23, D-88444 Ummendorf, Germany. <sup>4</sup>Center for Integrated Quantum Science and Technology (IQST), Albert-Einstein-Allee 11, D-89081 Ulm, Germany.

5.15

#### **Fabrication of tin vacancies in CVD diamond**

Rani Mary Joy<sup>1,2</sup>, Paulius Pobedinskas<sup>1,2</sup>, Rozita Rouzbahani<sup>1,2</sup>, Giridharan Krishnamurthy<sup>1,2</sup>, Miloš Nesládek<sup>1,2</sup>, Ken Haenen<sup>1,2</sup>

<sup>1</sup>Institute for Materials Research (IMO), Hasselt University, 3590 Diepenbeek, Belgium. <sup>2</sup>IMOMECA, IMEC vzw, 3590 Diepenbeek, Belgium.

5.16

#### **Incorporation of nitrogen into nanocrystalline diamond films studied by multi-wavelength Raman spectroscopy**

Miklós Veres<sup>1</sup>, Tamás Váczai<sup>1</sup>, Roman Holomb<sup>1</sup>, Victor Ralchenko<sup>2</sup>, Cyril Popov<sup>3</sup>, László Himics<sup>1</sup>

<sup>1</sup>HUN-REN Wigner Research Centre for Physics, Konkoly-Thege M. str. 29-33, 1121 Budapest, Hungary. <sup>2</sup>Prokhorov General Physics Institute, Russian Academy of Sciences, Vavilova st. 38, 119991 Moscow, Russia. <sup>3</sup>University of Kassel, Heinrich-Plett-Str. 40, 34132 Kassel, Germany.

5.17

#### **Incorporation of nitrogen during CVD measured through quantum sensing**

Jeroen Prooth<sup>1,2</sup>, Olga Rubinas<sup>1,2</sup>, Michael Petrov<sup>2</sup>, Milos Nesladek<sup>1,2</sup>

<sup>1</sup>IMOMEC, imec, Kapeldreef 75, Heverlee, B-3001 Belgium. <sup>2</sup>Institute for Materials Research (IMO), Hasselt University, Wetenschapspark 1, Diepenbeek, B-3590 Belgium.

5.18

#### **Machine Learning Assisted Growth of Nitrogen Vacancy Diamonds**

Collin N. Muniz<sup>1</sup>, Dane W. deQuilettes<sup>1,2</sup>, Eden Price<sup>1</sup>, Linh Pham<sup>1,2</sup>, Arthur Kurlej<sup>1</sup>, Swaroop Vattam<sup>3</sup>, Justin Mallek<sup>1</sup>, Alexander Melville<sup>1</sup>, Tom Osadchy<sup>1</sup>, Boning Li<sup>4</sup>, Guoqing Wang<sup>4</sup>, Jennifer Schloss<sup>1</sup>, Paola Cappellaro<sup>3,4,5</sup>, Danielle Braje<sup>1,2</sup>

<sup>1</sup>Division of Quantum Information and Integrated Nanosystems, Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, MA, 02421, USA. <sup>2</sup>Center for Quantum Engineering, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA.

<sup>3</sup>Division of Artificial Intelligence and Systems, Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, MA, 02421, USA.

<sup>4</sup>Department of Nuclear Science and Engineering, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA. <sup>5</sup>Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA, 02139, USA.

5.19

#### **Controlled positioning of NV centres in optical resonators by N-doped CVD growth**

Nicola Lang, Christian Giese, Patricia Quellmalz, Isabel Wiegand, Rebekka Eberle, Daniel Hähnel, Peter Knittel

Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, Freiburg, Germany

5.20

#### **Enhancing Quantum Sensing through Preferentially-Aligned Nitrogen Vacancy Centers on (111) and (110) Diamond**

Marina Davydova, Rebekka Eberle, Patrik Stranak, Patricia Quellmalz, Peter Knittel

Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, 79108 Freiburg, Germany

5.21

#### **Optimization of the Atmospheric Annealing Processes for Creation of Group IV-V Centers in Diamond**

Tomoya Baba<sup>1,2</sup>, Masatomi Iizawa<sup>2</sup>, Kosuke Kimura<sup>1,2</sup>, Airi Kawasaki<sup>1</sup>, Takashi Taniguchi<sup>3</sup>, Masashi Miyakawa<sup>3</sup>, Osamu Hanaizumi<sup>1</sup>, Shinobu Onoda<sup>2,4</sup>

<sup>1</sup>Faculty of Science and Technology, Gunma University, 1-5-1 Tenjincho, Kiryu, 376-8515, Gunma, Japan. <sup>2</sup>Takasaki Institute for Advanced Quantum Science, National Institutes for Quantum Science and Technology, 1233 Watanuki, Takasaki, Gunma, 370-1292, Japan. <sup>3</sup>National Institute for Materials Science, Namiki 1-1, Tsukuba, 305-0044, Ibaraki, Japan. <sup>4</sup>Quantum Information Research Center, Yokohama National University, 79-5 Tokiwadai, Hodogaya, Yokohama 240-8501, Japan.

5.22

#### **Ambiguous Resonances in Multipulse Quantum Sensing**

Lucas B. E. Tsunaki<sup>1</sup>, Kseniia Volkova<sup>1</sup>, Anmol Singh<sup>1</sup>, Sergei Trofimov<sup>1</sup>, Tommaso Pregnolato<sup>2</sup>, Tim Schröder<sup>2</sup>, Boris Naydenov<sup>1,3</sup>

<sup>1</sup>Department Spins in Energy Conversion and Quantum Information Science (ASPIN), Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Hahn-Meitner-Platz 1, 14109 Berlin, Germany. <sup>2</sup>Department of Physics, Humboldt-Universität zu Berlin, Newtonstraße 15, 12489 Berlin, Germany <sup>3</sup>Berlin Joint EPR Laboratory, Fachbereich Physik, Freie Universität Berlin, 14195 Berlin, Germany

5.23

#### **Hyperpolarized NMR spectroscopy enhanced by nuclear spin refocusing**

Tobias Spohn<sup>1</sup>, Nicolas Staudenmaier<sup>1</sup>, Gerhard Wolff<sup>1</sup>, Genko Genov<sup>1</sup>, Philipp Vetter<sup>1</sup>, Raúl Gonzalez<sup>1</sup>, Jens Fuhrmann<sup>1</sup>, Jochen Scharpf<sup>2</sup>, Thomas Unden<sup>2</sup>, Philipp Neumann<sup>2</sup>, Fedor Jelezko<sup>1</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, Albert-Einstein-Allee 11, Ulm, Germany. <sup>2</sup>NVision Imaging Technologies GmbH, Wolfgang-Paul-Straße 2, Ulm, Germany.

5.24

#### **Confocal microscopy in a controlled atmosphere for nano-scale nuclear magnetic resonance spectroscopy**

Kseniia Volkova<sup>1</sup>, Abhijeet Kumar<sup>2</sup>, Karolina Schüle<sup>3</sup>, Jens Fuhrmann<sup>3</sup>, Fedor Jelezko<sup>3</sup>, Kirill Bolotin<sup>2</sup>, Boris Naydenov<sup>1</sup>

<sup>1</sup>Department Spins in Energy Conversion and Quantum Information Science (ASPIN), Helmholtz-Zentrum Berlin für Materialien und Energie GmbH, Kekuléstraße, Berlin, Germany. <sup>2</sup>Department of Physics, Freie Universität Berlin, Arnimallee, Berlin, Germany. <sup>3</sup>Institut für Quantenoptik, Freie Universität Ulm, Albert-Einstein-Allee, Ulm, Germany.

5.25

**Low-field magnetic sensing with nitrogen-vacancy centers in nanodiamond for chemical reaction monitoring**

María Camposano<sup>1,2</sup>, Omkar Dhungel<sup>1,2</sup>, Mariusz Mrózek<sup>3</sup>, Arne Wickenbrock<sup>1,2</sup>, Anna Ermakova, Dmitry Budker<sup>1,2,5</sup>, Wojciech Gawlik<sup>3</sup>, Adam M. Wojciechowski<sup>3</sup>

<sup>1</sup>Helmholtz-Institut Mainz, GSI Helmholtzzentrum für Schwerionenforschung GmbH, 55128 Mainz, Germany. <sup>2</sup>Johannes Gutenberg-Universität Mainz, 55128 Mainz, Germany. <sup>3</sup>Jagiellonian University, Faculty of Physics, Astronomy and Applied Computer Science, Lojasiewicza St. 11, 30-348 Krakow, Poland. <sup>4</sup>Hasselt University, Diepenbeek, Belgium. <sup>5</sup>Department of Physics, University of California, Berkeley, California 94720-300, USA.

5.26

**Abnormal charge state switching of single NV centers via voltage control**

Darya Menailava<sup>1</sup>, Michael Petrov<sup>1</sup>, Milos Nesladek<sup>1</sup>

<sup>1</sup>IMO-IMOMECE, Hasselt University, Wetenschapspark 1, Diepenbeek, Belgium.

5.27

**Photoelectrical readout of single shallowly implanted NV centres in diamond**

Ilija Chuprina<sup>1</sup>, Christoph Findler<sup>1,2</sup>, Johannes Lang<sup>2</sup>, Petr Siyushev<sup>3</sup>, Fedor Jelezko<sup>1</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, D-89081 Germany. <sup>2</sup>Diatope GmbH, Buchenweg 23, D-88444 Ummendorf, Germany.

<sup>3</sup>Institute for Materials Research, Hasselt University, Wetenschapspark 1, 3590 Diepenbeek, Belgium.

5.28

**Temperature dependence of charge conversion during NV-center relaxometry**

Isabel Cardoso Barbosa<sup>1</sup>, Jonas Gutsche<sup>1</sup>, Stefan Dix<sup>1</sup>, Dennis Lönard<sup>1</sup>, and Artur Widera<sup>1</sup>

<sup>1</sup>Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern-Landau, Erwin-Schroedinger-Str. 46, 67663 Kaiserslautern, Germany

5.29

**Assembly of industry-ready HPHT-diamond diaphragms containing NV-centres into pressure sensor devices**

Mario Bähr<sup>1</sup>, Raphael Kuhnen<sup>2</sup>, Christoph Wild<sup>3</sup>, Wolfgang Knolle<sup>4</sup>, Andre Grün<sup>1</sup>, Thomas Frank<sup>1</sup>, Thomas Ortlepp<sup>1</sup>

<sup>1</sup>CIS Forschungsinstitut für Mikrosensorik GmbH, Konrad-Zuse-Str. 14, 99099 Erfurt, Germany. <sup>2</sup>Endress+Hauser SE+Co. KG, Hauptstraße 1, 79689 Maulburg, Germany. <sup>3</sup>Diamond Materials GmbH & Co. KG, Hans-Bunte-Straße 19, 79108 Freiburg, Germany.

<sup>4</sup>Leibniz-Institut für Oberflächenmodifizierung e.V., Permoserstraße 15, 04318 Leipzig.

5.30

**Diamond surface preparation for optically coherent NV centers in nanostructures**

Kilian Unterguggenberger<sup>1</sup>, Marco E. Stucki<sup>1,2</sup>, Tommaso Pregnolato<sup>1,2</sup>, Tim Schröder<sup>1,2</sup>

<sup>1</sup>Department of Physics, Humboldt-Universität zu Berlin, Newtonstr. 15, 12489 Berlin, Germany. <sup>2</sup>Ferdinand-Braun-Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik, Gustav-Kirchhoff-Str. 4, 12489 Berlin, Germany.

5.31

**Surface morphology dependent emission properties of colour centre containing CVD nanodiamond films**

László Himics<sup>1</sup>, Dávid Gál<sup>1</sup>, Péter Csíkvári<sup>2</sup>, Roman Holomb<sup>1</sup>, Tamás Vácz<sup>1</sup>, Margit Koós<sup>1</sup>, Miklós Veres<sup>1</sup>

<sup>1</sup>HUN-REN Wigner Research Centre for Physics, Konkoly-Thege Miklós str. 29-33, Budapest, 1121, Hungary. <sup>2</sup>Budapest University of Technology and Economics, Budafoki str. 8, Budapest, 1111, Hungary.

5.32

**Comprehensive Characterization of Nitrogen-Vacancy (NV) Center Ensembles in Diamond for Quantum Sensing Applications**

Jixing Zhang<sup>1</sup>, Mingxin Li<sup>2</sup>, Andrej Denisenko<sup>1</sup>, Joerg Wrachtrup<sup>1</sup>

<sup>1</sup>3rd Institute of Physics, University of Stuttgart, Allmandring 13, Stuttgart, Germany. <sup>2</sup>School of Instrumentation and Optoelectronic Engineering, Beihang University, Xueyuan Road 37, Beijing, China.

5.33

**NV Centers in diamond as a CL temperature probe**

Pablo Sáenz de Santa María Modroño<sup>1</sup>, Gwenolé Jacopin<sup>1</sup>

<sup>1</sup>Institut Néel CNRS/UGA, 25 rue des Martyrs 38042 Grenoble cedex 9, France.

5.34

#### **Probing heat transport in diamond cantilevers with NV centers as quantum thermometers**

Valentin Goblot<sup>1,2</sup>, Kexin Wu<sup>1,3</sup>, Enrico Di Lucente<sup>4</sup>, Elena Losero<sup>1</sup>, Hossein Babashah<sup>1</sup>, Nicola Marzari<sup>4</sup>, Michele Simoncelli<sup>5</sup>, Christophe Galland<sup>1,2</sup>

<sup>1</sup>Institute or Department, University or Company, Street Address, City, Country. <sup>1</sup>Institute of Physics, Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland. <sup>2</sup>Center for Quantum Science and Engineering, EPFL, Lausanne, Switzerland. <sup>3</sup>PROUD SA, Lausanne, Switzerland. <sup>4</sup>Theory and Simulation of Materials and National Centre for Computational Design and Discovery of Novel Materials, EPFL, Lausanne, Switzerland. <sup>5</sup>Cavendish Laboratory, University of Cambridge, Cambridge, United Kingdom

5.35

#### **Nanoscale temperature sensor for biological applications**

Alevtina Shmakova<sup>1</sup>, Sarra Zaghbouni<sup>2</sup>, Josef Soucek<sup>1</sup>, Michael Petrov<sup>1</sup>, Klaudia Kvakova<sup>3</sup>, Veronika Chadimova<sup>3</sup>, Jitka Neburkova<sup>3</sup>, Petr Cigler<sup>3</sup>, Bert Brone<sup>2</sup>, Milos Nesladek<sup>1</sup>

<sup>1</sup>IMO-IMOMECE, Hasselt University, Wetenschapspark 1, 3590 Diepenbeek, Belgium. <sup>2</sup>BIOMED, Hasselt University, Agoralaan gebouw C, 3590 Diepenbeek, Belgium. <sup>3</sup>Institute of Organic Chemistry and Biochemistry of the CAS, Flemingovo nam. 2, 160 00 Prague, Czechia.

5.36

#### **Technological steps for realization of diamond-based quantum tokens**

Miriam Mendoza Delgado<sup>1</sup>, Lucas Tsunaki<sup>2</sup>, Shaul Michaelson<sup>3</sup>, Jan Thieme<sup>4</sup>, Johann P. Reithmaier<sup>1</sup>, Kilian Singer<sup>4</sup>, Alon Hoffman<sup>3</sup>, Boris Naydenov<sup>2</sup>, Cyril Popov<sup>1</sup>

<sup>1</sup>Institute of Nanostructure Technologies and Analytics, Center for Interdisciplinary Nanostructure Science and Technology (CINSA-T), University of Kassel, Heinrich-Plett-Straße 40, Kassel, Germany. <sup>2</sup>Spins in Energy Conversion and Quantum Information Science, Helmholtz-Zentrum Berlin für Materialien und Energie (HZB), Hahn-Meitner-Platz 1, Berlin, Germany. <sup>3</sup>Schulich Faculty of Chemistry and Solid State Institute, Technion, Haifa, Israel. <sup>4</sup>Institute of Physics, CINSA-T, University of Kassel, Heinrich-Plett-Straße 40, Kassel, Germany.

5.37

#### **Real-world NV-center vector magnetometry of a 3D coil system**

Dennis Lönard<sup>1</sup>, Stefan Dix<sup>1</sup>, Isabel Cardoso Barbosa<sup>1</sup>, Artur Widera<sup>1</sup>

<sup>1</sup>Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern-Landau, Erwin-Schroedinger-Str. 46, 67633 Kaiserslautern, Germany.

5.38

#### **Fabrication and optimization of Solid Immersion Lenses in diamond for sensing and cryogenic applications**

Stefan Dietel<sup>1</sup>, Judith de Vries<sup>1</sup>, Michael Olney-Fraser<sup>1</sup>, Katharina Senkalla<sup>1</sup>, Lev Kazak<sup>1</sup>, Petr Siyushev<sup>2</sup>, Fedor Jelezko<sup>1</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, Meyerhofstraße M26, 89081 Ulm, Germany. <sup>2</sup>Institute for Materials Research (IMO), University of Hasselt, Wetenschapspark 1, 3590 Diepenbeek, Belgium.

5.39

#### **A compact radiofrequency spectrum analyser based on nitrogen-vacancy centers in diamond**

Rosalie Labbe<sup>1</sup>, Simone Magaletti<sup>1</sup>, Ludovic Mayer<sup>1</sup>, Marianne Le Dantec<sup>2</sup>, Ronan Guillamet<sup>2</sup>, Xuan Phuc Le<sup>1</sup>, Jean-François Roch<sup>3</sup>, Yves Henri Audic<sup>2</sup>, Thierry Debuisschert<sup>1</sup>

<sup>1</sup>Thales Research and Technology, 1 avenue Augustin Fresnel, 91767 Palaiseau Cedex, France. <sup>2</sup>Thales Defence Mission Systems, 10 avenue de La 1ère Dfl, 29238 Brest, France. <sup>3</sup>Université Paris-Saclay, CNRS, ENS Paris-Saclay, CentraleSupélec, LuMIn, 91190 Gif-sur-Yvette, France.

5.40

#### **High-dynamic-range high-sensitivity NV-based Vector Magnetometry**

Yi-Hua Wang<sup>1</sup>, Jixing Zhang<sup>1</sup>, Jörg Wrachtrup<sup>1</sup>

<sup>1</sup>3rd Physical Institute, University of Stuttgart, Stuttgart, Germany



5.41

**Free induction decay measurements of a Nitrogen-Vacancy centres ensemble in a weak transverse magnetic field**

G. Zanelli<sup>1,2</sup>, E. Bernardi<sup>1</sup>, E. Moreva<sup>1</sup>, E. Losero<sup>1</sup>, P. Olivero<sup>2,3</sup>, J. Forneris<sup>2,3</sup>, S. Ditalia Tchernij<sup>2,3</sup>, Ž. Pastuović<sup>4</sup>, P. Traina<sup>1</sup>, I. Degiovanni<sup>1</sup>, M. Genovese<sup>1</sup>.

<sup>1</sup>Istituto nazionale di Ricerca Metrologica, Strada delle Cacce 91, 10135 Turin, Italy. <sup>2</sup>Department of Physics, University of Torino, Via P. Giuria 1, 10125 Torino, Italy. <sup>3</sup>Istituto Nazionale di Fisica Nucleare (INFN) Sez. Torino, Torino, Italy. <sup>4</sup>Centre for Accelerator Science, Australian Nuclear Science and Technology Organisation, New Illawarra Road, Lucas Heights, NSW, 2234, Australia.

5.42

**Near zero-field magnetic imaging of a cross-structure with nitrogen vacancy centers in diamond**

Saravanan Sengottuvel<sup>1</sup>, Mariusz Mrózek<sup>1</sup>, Omkar Dhungel<sup>2</sup>, Arne Wickenbrock<sup>2,3</sup>, Dmitry Budker<sup>2,3,4</sup>, Wojciech Gawlik<sup>1</sup>, Adam M. Wojciechowski<sup>1</sup>

<sup>1</sup>Institute of Physics, Jagiellonian University, Łojasiewicza 11, 30-348 Kraków, Poland. <sup>2</sup>Helmholtz-Institut Mainz, GSI Helmholtzzentrum für Schwerionenforschung GmbH, 55128 Mainz, Germany. <sup>3</sup>Johannes Gutenberg-Universität Mainz, 55128 Mainz, Germany. <sup>4</sup>Department of Physics, University of California, Berkeley, California 94720-300, USA.

5.43

**Enhancing photon collection from single shallow nitrogen-vacancy centres in diamond nanopillars for quantum heterodyne measurements**

Akirabha Chanuntranont<sup>1</sup>, Kazuki Otani<sup>1</sup>, Daiki Saito<sup>1</sup>, Yuki Ueda<sup>1</sup>, Masato Tsugawa<sup>1</sup>, Shuntaro Usui<sup>1</sup>, Yuto Miyake<sup>1</sup>, Tokuyuki Teraji<sup>2</sup>, Shinobu Onada<sup>3</sup>, Takahiro Shinada<sup>4</sup>, Hiroshi Kawarada<sup>1</sup>, and Takashi Tani<sup>1</sup>

<sup>1</sup>School of Fundamental Science and Engineering, Waseda University, 3-4-1 Okubo, Shinjuku, Tokyo, Japan. <sup>2</sup>National Institute of Materials Science, 1-1 Namiki, Tsukuba, Ibaraki, Japan. <sup>3</sup>National Institutes for Quantum Science and Technology, 1233 Watanuki, Takasaki, Gunma, Japan. <sup>4</sup>Center for Innovative Integrated Electronic Systems, Tohoku University, 486-1 Aramaki-aza-aoba, Aoba, Sendai, Miyagi, Japan.

5.44

**Sensitivity enhancement of a diamond quantum sensor with continuously excited Ramsey protocol**

Yuta Araki<sup>1</sup>, Ikuya Fujisaki<sup>1</sup>, Zehan Li<sup>1</sup>, Yuji Hatano<sup>1</sup>, Takeharu Sekiguchi<sup>1</sup>, Takayuki Iwasaki<sup>1</sup>, Mutsuko Hatano<sup>1</sup>

<sup>1</sup>Department of Electrical and Electronics Engineering, Tokyo Institute of Technology 2-12-1 NE-18, Ookayama, Meguro-ku, Tokyo, 152-8552, Japan

5.45

**Fiber-Coupled Absorption-based Quantum Nanoprobes with NV Ensembles in a Suspended Diamond Photonic Cavity**

Yuchun Zhu<sup>1</sup>, Amirali Arabmoheghi<sup>1</sup>, Claudio Alejandro Jaramillo Concha<sup>1</sup>, Darin Merchant<sup>1</sup>, Niels Quack<sup>2</sup>, Christophe Galland<sup>1</sup>

<sup>1</sup>Institute of Physics, Swiss Federal Institute of Technology, Rte Cantonale, 1015, Lausanne, Switzerland. <sup>2</sup>The University of Sydney, Camperdown NSW 2050, Australia.

5.46

**A miniaturized and integrated fiber-based magnetic field sensor**

Stefan Dix<sup>1</sup>, Dennis Lönard<sup>1</sup>, Isabel Cardoso Barbosa<sup>1</sup>, Jonas Gutsche<sup>1</sup>, Artur Widera<sup>1</sup>

<sup>1</sup>Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern-Landau, Erwin-Schrodinger-Str. 46, 67663 Kaiserslautern, Germany.

5.47

**Fabrication and Assembly of Fiber-coupled Diamond Nanobeam Scanning Probes for 2D Nanoscale Magnetic Imaging**

Yufan Li<sup>1,2</sup>, Gesa Welker<sup>1</sup>, Nina Codreanu<sup>3</sup>, Simon Gröblacher<sup>1</sup>, Ronald Hanson<sup>3</sup>, Richard Norte<sup>1,2</sup>, Toeno van der Sar<sup>1</sup>

<sup>1</sup>Department of Quantum Nanoscience, Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands.

<sup>2</sup>Department of Precision and Microsystems Engineering, Faculty of Mechanical, Maritime and Materials Engineering, Delft University of Technology, Delft, The Netherlands. <sup>3</sup>QuTech and Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands.

5.48

#### **Quantum Sensing and Imaging of van der Waals Ferromagnet using Nitrogen-Vacancy Centers**

Bindu<sup>1</sup>, [Amandeep Singh](#)<sup>1</sup>, Nir Bar-Gill<sup>1,2,3</sup>

<sup>1</sup>Applied Physics Department, The Hebrew University of Jerusalem, Jerusalem, 9190401, Israel. <sup>2</sup>The Center of Nano-Science and Nanotechnology, The Hebrew University of Jerusalem, Jerusalem, 9190401, Israel. <sup>3</sup>The Quantum Center, The Hebrew University of Jerusalem Jerusalem, 9190401, Israel. <sup>4</sup>The Racah Institute of Physics, The Hebrew University of Jerusalem, Jerusalem, 9190401, Israel.

5.49

#### **Towards Fast and Sensitive Characterization of Diamond Films and Surfaces through Wide-Field Imaging**

[Isabel Wiegand](#), Rebekka Eberle, Nicola Lang, Niklas Mathes, Peter Knittel, Daniel Hähnel

Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, Freiburg, Germany.

5.50

#### **Fast optoelectronic charge state conversion of silicon vacancies in diamond**

[Manuel Rieger](#)<sup>1</sup>, Viviana Villafane<sup>1,2</sup>, Lina M. Todenhagen<sup>1</sup>, Stephan Matthies<sup>2</sup>, Stefan Appel<sup>2</sup>, Martin S. Brandt<sup>1</sup>, Kai Müller<sup>2</sup>, Jonathan J. Finley<sup>1</sup>

<sup>1</sup>Walter Schottky Institute, School of Natural Sciences and MCQST, Technical University of Munich, Am Coulombwall 4, 85748 Garching, Germany. <sup>2</sup>Walter Schottky Institute, School of Computation, Information and Technology and MCQST, Technical University of Munich, Am Coulombwall 4, 85748 Garching, Germany.

5.51

#### **Towards Microwave Control of Silicon Vacancies in Diamond**

[Tobias Waldmann](#)<sup>1</sup>, Rubek Poudel<sup>1</sup>, Manuel Rieger<sup>1</sup>, Stefan Appel<sup>2</sup>, Kai Müller<sup>2</sup>, Jonathan Finley<sup>1</sup>, Viviana Villafane<sup>1,2</sup>

<sup>1</sup>Walter-Schottky Institute, School of Natural Sciences and MCQST, Technical University of Munich, Am Coulombwall 4, 85748 Garching, Germany. <sup>2</sup>Walter-Schottky Institute, School of Computation, Information and Technology and MCQST, Technical University of Munich, Am Coulombwall 4, 85748 Garching, Germany.

5.52

#### **Enhanced emission of SnV centers in diamond nano-pillars**

Soniya Nuchikkat<sup>1</sup>, Jan Fait<sup>1</sup>, Philipp Fuchs<sup>1</sup>, Christoph Pauly<sup>2</sup>, Frank Mücklich<sup>2</sup>, Michael Kieschnik<sup>3</sup>, Jan Meijer<sup>3</sup>, [Christoph Becher](#)<sup>1</sup>

<sup>1</sup>Fachbereich Physik, Universität des Saarlandes, 66123 Saarbrücken Germany. <sup>2</sup>Fachrichtung Materialwissenschaft und Werkstofftechnik, Universität des Saarlandes, 66123 Saarbrücken, Germany. <sup>3</sup>Universität Leipzig, Angewandte Quantensysteme, Linnéstraße 5, 04103 Leipzig, Germany.

5.53

#### **Broadband and Efficient Microwave Antenna using Standing Wave for Diamond Sensing Application**

[Yoshiki Yonamoto](#)

Hitachi, Ltd. 292 Totsuka-ku, Yoshida-cho, Yokohama, Kanagawa, Japan.

5.54

#### **Radial transfer matrix model for free-space emission optimization**

[Stefan Appel](#)<sup>1</sup>, Viviana Villafane<sup>1</sup>, Jonathan J. Finley<sup>1</sup>, Kai Müller<sup>1</sup>

<sup>1</sup>Walter Schottky Institut, Technische Universität München, Germany.

5.55

#### **Nanofabrication methods for suspended “Sawfish” cavities in diamond**

[Tommaso Pregolato](#)<sup>1,2</sup>, Marco E. Stucki<sup>1,2</sup>, Julian M. Bopp<sup>1,2</sup>, Maarten H. van der Hoeven<sup>2</sup>, Alok Gokhale<sup>2</sup>, Olaf Krüger<sup>1</sup>, and Tim Schröder<sup>1,2</sup>

<sup>1</sup>Ferdinand-Braun-Institut gGmbH, Gustav-Kirchhoff-Str. 4, 12489 Berlin, Germany. <sup>2</sup>Department of Physics, Humboldt-Universität zu Berlin, Newtonstr. 15, Berlin, Germany.

5.56

#### **Trapping of Nanodiamonds using Optical Tweezers**

[Alena Erlenbach](#), Isabel Cardoso Barbosa, Jonas Gutsche, Stefan Dix, Dennis Lönard, and Artur Widera

Department of Physics and State Research Center OPTIMAS, University of Kaiserslautern-Landau, Erwin-Schrodinger-Str. 46, 67663 Kaiserslautern, Germany.

5.57

**Fabrication of thin and highly smooth single crystal diamond platelets for quantum applications**

G. Seniutinas, M. Gonzalez, F. Favaro de Oliveira

*Qnami AG, Hofackerstrasse 40B, CH-4132 Muttenz, Switzerland.*

5.58

**Processing diamond materials for improved performance in quantum sensing and power electronics**

Adam J. Biacchi<sup>1</sup>, J. Trey Diulus<sup>1</sup>, Michele Kelley<sup>1</sup>, Sean M. Blakley<sup>2</sup>, Robert D. McMichael<sup>1</sup>, Andrei Kolmakov<sup>1</sup>

<sup>1</sup>National Institute of Standards and Technology, 100 Bureau Dr, Gaithersburg, Maryland, USA. <sup>2</sup>DEVCOM Army Research Lab, 2800 Powder Mill Rd, Adelphi, Maryland, USA.

5.59

**Fractal apertures in metamaterial-based waveguides for surface wave plasma CVD**

Katharina Hauer<sup>1</sup>, Johannes Fiedler<sup>1</sup>, Justas Zalieckas<sup>1</sup>

<sup>1</sup>Department of Physics and Technology, University of Bergen, Allégaten 55, Bergen, Norway.

5.60

**Reduction of strain distribution in CVD diamond lattice by using substrate with large misorientation angle**

Takeyuki Tsuji<sup>1</sup>, Chikara Shinei<sup>1</sup>, Takayuki Iwasaki<sup>2</sup>, Mutsuko Hatano<sup>2</sup>, Tokuyuki Teraji<sup>1</sup>

<sup>1</sup>Research Center for Electronic and Optical Materials, National Institute for Materials Science, 1-1 Namiki, Tsukuba, Ibaraki, 305-0044, Japan. <sup>2</sup>Department of Electrical and Electronic Engineering, Tokyo Institute of Technology 2-12-1 NE-18, Ookayama, Meguro-ku, Tokyo, 152-8552, Japan.

5.61

**Microwave plasma modelling for heterogeneous diamond growth on III-nitrides**

Jerome A. Cuenca, Soumen Mandal, Oliver A. Williams

*School of Physics and Astronomy, Cardiff University, Cardiff, CF24 3AA, United Kingdom*

5.62

**Model of Large Area Diamond Growth by MPCVD at 915 MHz**

Anton A. Kobelev<sup>1</sup>, Andrey D. Smirnov<sup>1</sup> and Sergey V. Baryshev<sup>2</sup>

<sup>1</sup>Semiconductor Technology Research d.o.o. Beograd, Science Technology Park, Veljka Dugoševića 54, Building B4, Belgrade, Serbia. <sup>2</sup>Electrical and Computer Engineering, Michigan State University, 428 S. Shaw Ln., East Lansing, USA.

5.63

**Multi-Scale simulation of CVD diamond growth: from the experimental conditions to the crystal morphology**

Audrey Valentin<sup>1</sup>, Divine R. Kamkoun<sup>1</sup>, Ovidiu Brinza<sup>2</sup>, and Fabien Bénédic<sup>1</sup>

<sup>1</sup>Université Sorbonne Paris Nord, LSPM, CNRS, UPR 3407, Villetaneuse, France <sup>2</sup>LSPM, CNRS, UPR 3407, Université Sorbonne Paris Nord, Villetaneuse, France.

5.64

**Modeling asymmetric diamond crystal shapes during temperature gradient HPHT growth**

Ilya V. Ponomarev<sup>1</sup>, Alim Saidkhodjaev<sup>2</sup>

<sup>1</sup>Euclid Beamlabs, 10000 Virginia Manor Rd, Ste 330, Beltsville, MD, 20705, USA. <sup>2</sup>University of Maryland, College Park, 8223 Paint Branch Dr, College Park, MD 20742, USA.

5.65

**Enhancing nanodiamond seeding through spray coating and inkjet printing: unravelling the impact of O<sub>2</sub>, CF<sub>4</sub> plasma, and UV-Ozone modification**

Pieter Verding<sup>1,2</sup>, Rani Mary Joy<sup>1,2</sup>, Dieter Reenaers<sup>1,2</sup>, Rachith Shanivarasanthe Nithyananda Kumar<sup>1,2</sup>, Rozita Rouzbahani<sup>1,2</sup>, Ewoud Jeunen<sup>1</sup>, Seppe Thomas<sup>1</sup>, Derese Desta<sup>1,2</sup>, Hans-Gerd Boyen<sup>1,2</sup>, Paulius Pobedinskas<sup>1,2</sup>, Ken Haenen<sup>1,2</sup>, Wim Deferme<sup>1,2</sup>

<sup>1</sup>Hasselt University, Institute for Materials Research (IMO), Wetenschapspark 1, 3590 Diepenbeek, Belgium. <sup>2</sup>IMEC vzw, IMOMECE, Wetenschapspark 1, 3590 Diepenbeek, Belgium.

5.66

**Selective growth of diamond on laser-treated seed layers**

Aleksandra M. Buchta, Folke Dencker, Evan L.H. Thomas, Marc C. Wurz

*Institute of Micro Production Technology, Leibniz University Hanover, An der Universität 2, Garbsen, Germany*

5.67

**Effect of seed density on the deposition of polycrystalline diamond films by plasma-enhanced chemical vapor deposition**

David Vázquez-Cortés, Stoffel D. Janssens, Eliot Fried

*Mechanics and Materials Unit, Okinawa Institute of Science and Technology Graduate University (OIST), 1919-1 Tancha, Onna-son, Kunigami-gun, Okinawa, 904-0495, Japan.*

5.68

**Optimized CVD growth conditions of (100)-oriented P-doped diamond films for p+/p-/n Schottky diodes**

Rozita Rouzbahani<sup>1</sup>, Paulius Pobedinskas<sup>1</sup>, David Eon<sup>2</sup>, and Ken Haenen<sup>1</sup>

<sup>1</sup>*Institute for Materials Research (IMO), Hasselt University, and IMOMEC, IMEC vzw, Diepenbeek, Belgium*

<sup>2</sup>*Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, Grenoble, France.*

5.69

**Optimizing growth of phosphorus-doped diamond via dynamic gas flow**

Kil-Dong Sung<sup>1</sup>, Stefan Andrei Irimiciuc<sup>1</sup>, Šárka Havlová<sup>1</sup>, Michal Novotný<sup>1</sup>, Zdeněk Weiss<sup>1</sup>, Jaromír Kopeček<sup>1</sup>, Andrew Taylor<sup>1</sup>, Vincent Mortet<sup>1</sup>

<sup>1</sup>*FZU - Institute of Physics of the Czech Academy of Sciences, Na Slovance 1999/2, Prague, Czech Republic.*

5.70

**Controlled positioning of NV centres in optical resonators by N-doped CVD growth**

Nicola Lang, Christian Giese, Patricia Quellmalz, Isabel Wiegand, Rebekka Eberle, Daniel Hähnel, Peter Knittel

*Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, Freiburg, Germany.*

5.71

**Diamond Encapsulated Plasmonic Nanostructures for SERS**

Kieran N. Twaddle, Massimiliano L. A. Ramsay, Richard B. Jackman

*London Centre for Nanotechnology and the Department of Electronic and Electrical Engineering, UCL (University College London), 17-19 Gordon Street, London, WC1H 0AH, UK.*

5.72

**Comparative study of AlN deposition on Si(1 1 1) and polycrystalline diamond by TEM**

L.Nieto-Sierra<sup>1</sup>, F.Lloret<sup>2</sup>, J.J.Gallardo<sup>3</sup>, J.Millán-Barba<sup>1</sup>, G.Alba<sup>1</sup>, D.Araujo<sup>1</sup>

<sup>1</sup>*Department of Material Sciences, University of Cádiz, 11510, Puerto Real, Spain.* <sup>2</sup>*Department of Applied Physics, University of Cádiz, 11510, Puerto Real, Spain.* <sup>3</sup>*Department of Physical Chemistry, University of Cádiz, 11510, Puerto Real, Spain.*

5.73

**Coating of self-sensing AFM cantilevers with boron-doped nanocrystalline diamond films at low temperatures**

Štěpán Potocký<sup>1</sup>, Jaroslav Kuliček<sup>1</sup>, Egor Ukraintsev<sup>1</sup>, Ondřej Novotný<sup>2</sup>, Alexander Kromka<sup>3</sup>, Bohuslav Rezek<sup>1</sup>

<sup>1</sup>*Faculty of Electrical Engineering, Czech Technical University in Prague, Technická 2, Prague, Czech Republic.* <sup>2</sup>*NenoVision s.r.o., Purkyňova 649/127, 612 00 Brno, Czech Republic.* <sup>3</sup>*Institute of Physics, Czech Academy of Sciences, Cukrovarnická 10, Prague 16200, Czech Republic.*

5.74

**Engineered Diamond Coatings Topographies for Osseointegration**

Marit Hougen<sup>1</sup>, Ivan R. Mondragon<sup>2</sup>, Mihaela Roxana Cimpan<sup>2</sup>, Paul Johan Høi<sup>3</sup>, Justas Zalieckas<sup>1</sup>

<sup>1</sup>*Institute of Physics and Technology, University of Bergen, Allégaten 55, Bergen, Norway.* <sup>2</sup>*Department for Clinical Dentistry, University of Bergen, Årstadveien 19, Bergen, Norway.* <sup>3</sup>*Department of Clinical Medicine, University of Bergen, Biomatlab, Laboratoriebygget, Bergen, Norway.*

5.75

**Simple Setup for Thermal and Plasma-Assisted Hydrogenation of Diamond**

Evgheni Strelcov, J. Trey Diulus, Kin Cheung, Andrei Kolmakov

*National Institute of Standards and Technology, 100 Bureau Dr, Gaithersburg, Maryland, USA*

5.76

**Simulated hydrogen diffusion in diamond grain boundaries**

James A. Pittard<sup>1</sup>, Mikhail Y. Lavrentiev<sup>2</sup>, Neil A. Fox<sup>1</sup>

<sup>1</sup>*School of Physics, HH Wills Physics Laboratory, University of Bristol, Tyndall Avenue, Bristol, BS8 1TL.* <sup>2</sup>*UKAEA, Culham Science Centre, Abingdon, OX14 3DB.*

5.77

**Optimizations of Single-Crystal Diamond Surfaces for Implantation, Membranes and Nanophotonic Structures**

Lukas Wolfram<sup>1</sup>, Julia Heupel<sup>1</sup>, Johann P. Reithmaier<sup>1</sup> and Cyril Popov<sup>1</sup>

<sup>1</sup>*Institute of Nanostructure Technologies and Analytics (INA), University of Kassel, Heinrich-Plett-Str. 40, 34132 Kassel, Germany.*

5.78

**Planar 2-inch diamond wafers as a basis for functional microstructures and quantum optical applications**

Jan Engels, Jürgen Weippert, Tingpeng Luo, Lukas Lindner, Jan Kustermann, Patricia Quellmalz, Christian Giese, Jan Jeske, Peter Knittel, Lutz Kirste, Vadim Lebedev

*Fraunhofer IAF, Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, D-79108 Freiburg.*

5.79

**Oxygen-terminated diamond: insights into the correlation between surface oxygen configurations and work function values**

Ramiz Zulkharnay<sup>1\*</sup>, Gulnur Zulpukarova<sup>1</sup>, Neil Fox<sup>1,2</sup> and Paul W. May<sup>1</sup>

<sup>1</sup>*School of Chemistry, University of Bristol, Cantock's Close, Bristol, BS8 1TS, UK, <sup>2</sup>School of Physics, H.H. Wills Physics Laboratory, University of Bristol, Tyndall Avenue, Bristol, BS8 1TL, UK*

5.80

**Recent development in DFT+VTST investigations of (100)–(2×1):H diamond surfaces by means of first-principle calculations**

Emerick Y. Guillaume<sup>1,2,3,4</sup>, Danny E. P. Vanpoucke<sup>1,2,3</sup>, Luc Henrard<sup>4</sup>, Ken Haenen<sup>1,3</sup>

<sup>1</sup>*Instituut voor materiaalonderzoek, Universiteit Hasselt, Wetenschapspark 1, 3590 Diepenbeek, Belgium. <sup>2</sup>QuATOMs, Universiteit Hasselt, Agoralaan, 3590 Diepenbeek, Belgium. <sup>3</sup>IMOMECE, IMEC vzw, Wetenschapspark 1, 3590 Diepenbeek, Belgium. <sup>4</sup>Namur Institute of Structured Matter (NISM), University of Namur, Rue de Bruxelles 61, 5000 Namur, Belgium.*

5.81

**Chemical and Morphological Stability of Diamond Device Interfaces Under Harsh Environments**

J. Trey Diulus, Evgheni Strelcov, Adam Biacchi, Andrei Kolmakov

*Nanoscale Device Characterization Division, PML, NIST, Gaithersburg, MD, 20899, USA*

5.82

**Enhanced Cyclic Stability in Diamond Supercapacitors via Mn-Ion Implantation-Induced Dual-Phase MnO<sub>2</sub>-Graphitic Transformation**

Sujit Deshmukh<sup>1</sup>, Srinivasu Kunuku<sup>1</sup>, Pawel Jakobczyk<sup>1</sup>, Adrian Olejnik<sup>1</sup>, Chien-Hsu Chen<sup>2</sup>, Huan Niu<sup>2</sup>, Bing Yang<sup>3</sup>, Nianjun Yang<sup>4</sup> and Robert Bogdanowicz<sup>1</sup>

<sup>1</sup>*Gdansk University of Technology 11/12 G. Narutowicza Str., 80-233 Gdansk, Poland. <sup>2</sup>National Tsing Hua University, Hsinchu 300044, Taiwan. <sup>3</sup>Institute Shenyang National Laboratory for Materials, No. 72 Wenhua Road, Shenyang 110016, China. <sup>4</sup>Hasselt University, Diepenbeek, Belgium.*

5.83

**Application of diamond derived carbon in a sulphur doped high performance anode for sodium ion batteries**

Tobias Neff<sup>1,2</sup>, Leonhard Kolb<sup>2</sup>, Anke Krueger<sup>1</sup>

<sup>1</sup>*Institute of Organic Chemistry, University of Stuttgart, Pfaffenwaldring 55, 70569, Stuttgart, Germany. <sup>2</sup>Institute for Organic Chemistry, Julius-Maximilian University Würzburg, Am Hubland, 97074, Würzburg, Germany.*

5.84

**Boron-doped carbon nanowall and boron-doped diamond electrodes for electrochemical detection of paraquat and glyphosate herbicides**

Paweł Jakóbczyk, Mateusz Ficek, Mattia Pierpaoli, Robert Bogdanowicz

*Department of Metrology and Optoelectronics, Faculty of Electronics, Telecommunications and Informatics, Gdansk University of Technology, 11/12 G. Narutowicza Street, 80-233 Gdansk, Poland.*

5.85

**Fabrication at the speed of light: towards analyte-specific sensors made of diamond using UV laser as energy source**

Mariana Silva<sup>1,2</sup>, Nádia E. Santos<sup>1,3</sup>, Ricardo Oliveira<sup>2</sup>, Miguel Neto<sup>4</sup>, Filipe Oliveira<sup>4</sup>, Jonas Deuermeier<sup>5</sup>, Milan Maradiya<sup>6</sup>, Michael Liehr<sup>6</sup>, Filipe A. Almeida Paz<sup>3</sup>, Susana S. Braga<sup>1</sup>, Joana C. Mendes<sup>2</sup>

<sup>1</sup>LAQV-REQUIMTE, Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal. <sup>2</sup>Instituto de Telecomunicações, University of Aveiro, 3810-193 Aveiro, Portugal. <sup>3</sup>CICECO, Department of Chemistry, University of Aveiro, 3810-193 Aveiro, Portugal. <sup>4</sup>CICECO, Department of Materials and Ceramic Engineering, University of Aveiro, 3810-193 Aveiro, Portugal. <sup>5</sup>CENIMAT|i3N, Department of Materials Science, School of Science and Technology, NOVA University Lisbon and CEMOP/UNINOVA, 2829-516, Caparica, Portugal. <sup>6</sup>W&L Coating Systems, GmbH, Reichelsheim, Germany.

5.86

**Electrochemistry Using Nanostructured Diamond Electrodes**

Mengai Mao, Paul W. May, Alex Black, Tom Taylor, Luca Riley

School of Chemistry, University of Bristol, Bristol, BS8 1TS, United Kingdom.

5.87

**Periodically patterned boron-doped diamond electrodes for electrochemical applications**

Mateusz Ficek<sup>1</sup>, Paweł Jakóbczyk<sup>1</sup>, Bartłomiej Stonio<sup>2</sup>, and Robert Bogdanowicz<sup>1</sup>

<sup>1</sup>Faculty of Electronics, Telecommunications and Informatics, Gdańsk University of Technology, 11/12 Narutowicza St., 80-233 Gdansk, Poland. <sup>2</sup>Warsaw University of Technology, Institute of Microelectronics and Optoelectronics, Koszykowa 75, 00-662 Warsaw, Poland.

5.88

**Diamond-on-polyimide flexible implant for cortical recordings**

Clément Hébert<sup>1</sup>, Gaëlle Lissorgue<sup>2</sup>, Blaise Yvert<sup>1</sup>, Lionel Rousseau<sup>2</sup>

<sup>1</sup>Univ. Grenoble Alpes, Inserm, U1216, Grenoble Institut Neurosciences, GIN, Grenoble, 38000 ESYCOM-ESIEE,. <sup>2</sup>University Gustave Eiffel, 77420 Champs-sur-Marne, France.

5.89

**B,N-codoped carbon nanowalls for non-faradaic electrochemical impedimetric detection of E.coli**

Mattia Pierpaoli<sup>1</sup>, Elif Atay<sup>2</sup>, Aylin Altan<sup>2</sup>, Agnieszka Kalinowska<sup>3</sup>, Robert Bogdanowicz<sup>1</sup>

<sup>1</sup>Department of Metrology and Optoelectronics, Gdańsk University of Technology, 11/12 Gabriela Narutowicza Street, 80-233 Gdańsk, Poland. <sup>2</sup>Department of Food Engineering, Mersin University, Çiftlikköy, 33343 Mersin, Türkiye. <sup>3</sup>Department of Environmental Engineering Technology, Gdańsk University of Technology, 11/12 Gabriela Narutowicza Street, 80-233 Gdańsk, Poland.

5.90

**Design and Applications of Diamond Composites**

Ximan Dong<sup>1</sup>, Xinyue Chen<sup>1</sup>, Xin Jiang<sup>1</sup>, Nianjun Yang<sup>2</sup>

<sup>1</sup>Institute of Materials Engineering, University of Siegen, 57076 Siegen, Germany. <sup>2</sup>Institute for Materials Research (IMO), Hasselt University, 3590 Diepenbeek, Belgium. <sup>3</sup>IMOMECE, IMEC vzw, 3590 Diepenbeek, Belgium.

5.91

**Fabrication and Applications of Diamond/graphite Nano-composite Film**

Zhaofeng Zhai<sup>1</sup>, Nan Huang<sup>1</sup>, Chuyan Zhang<sup>1</sup>, Bing Yang<sup>1</sup>, Xin Jiang<sup>1,2</sup>

<sup>1</sup>Shenyang National Laboratory for Materials Science (SYNL), Institute of Metal Research (IMR), Chinese Academy of Sciences (CAS), No.72 Wenhua Road, Shenyang 110016, China. <sup>2</sup>Institute of Materials Engineering, University of Siegen, No.9-11 Paul-Bonatz-Str., Siegen 57076, Germany.

5.92

**Functionalisation of detonation nanodiamond with small zwitterionic peptides to control interactions and improve biocompatibility in biological environments**

Elisabeth Mayerhoefer<sup>1</sup>, Harsh Nitin Dongre<sup>2</sup>, Daniela Elena Costea<sup>2</sup>, Anke Krueger<sup>1</sup>

<sup>1</sup>Institute of Organic Chemistry, University of Stuttgart, Pfaffenwaldring 55, 70569 Stuttgart, Germany. <sup>2</sup>The Gade Laboratory for Pathology and Centre for Cancer Biomarkers (CCBIO), Department of Clinical Medicine, University of Bergen, Jonas Lies vei 87, 5021 Bergen, Norway.

5.93

**Characterizing Infrared Effects on Nanodiamond Fluorescence for Intracellular Temperature Measurement by using ODMR**

Arthur Dervillez<sup>1</sup>, Maria Niora<sup>1</sup>, Alexander Huck<sup>2</sup>, Kirstine Berg-Sørensen<sup>1</sup>

<sup>1</sup>Health Technology, DTU, Bygning, Ørstedes Pl. 345C, 2800 Kongens Lyngby, Denmark. <sup>2</sup>Department of Physics, DTU, Fysikvej, building 311, 2800 Kongens Lyngby, Denmark.

5.94

**Towards the next level of in vitro free radical quantum sensing: biocompatibility and biodistribution of NV--FNDs in precision-cut tissue slices from mouse organs**

Alina Sigaeva<sup>1,2</sup>, Arturo Elías Llumbet<sup>2</sup>, Britt Coenen<sup>2</sup>, Claudia Reyes San Martin<sup>2</sup>, Elkin Escobar<sup>2</sup>, Willem Woudstra<sup>2</sup>, Siyu Fan<sup>2</sup>, Aldona Mzyk<sup>3</sup>, Yue Zhang<sup>2</sup>, Rokshana Sharmin<sup>2</sup>, Dorenda Oosterhuis<sup>2</sup>, Alan R. Gorter<sup>2</sup>, Peter Olinga<sup>2</sup>, Romana Schirhagl<sup>2</sup>

<sup>1</sup>SciLifeLab, Tomtebodavägen 23, 171 65 Solna, Sweden. <sup>2</sup>Department of Biomaterials & Biomedical Technology, University Medical Center Groningen, University of Groningen, Hanzeplein 1, Groningen, The Netherlands. <sup>3</sup>DTU Health Tech, Ørstedes Plads Bldg 345C, 2800 Kongens Lyngby, Denmark.

5.95

**Diamond-based platforms for biochemical measurements of time-resolved clock cell signaling**

Rezvaneh Ghasemitabesh<sup>1</sup>, Daniel Merker<sup>1</sup>, Daniela Bertinetti<sup>2</sup>, Friedrich W. Herberg<sup>2</sup>, Cyril Popov<sup>1</sup>

<sup>1</sup>Institute of Nanostructure Technologies and Analytics (INA), Center for Interdisciplinary Nanostructure Science and Technology (CINSA-T), University of Kassel, Germany. <sup>2</sup>Department of Biochemistry, Center for Interdisciplinary Nanostructure Science and Technology (CINSA-T), University of Kassel, Germany.

5.96

**Manipulating and Detecting Subcellular Temperatures through Organelle-Targeted Photothermal Nanodiamond Complexes**

Kaiqi Wu, Qi Lu, Yingke Wu, and Tanja Weil

Max Planck Institute for Polymer Research, Ackermannweg 10, 55128 Mainz, Germany

5.97

**Photonic Quantum Nanosensors for Subcellular Neuronal Signaling**

Beatriz N. L. Costa<sup>1</sup>, Filipe Camarneiro<sup>1</sup>, Ana Marote<sup>2</sup>, Catarina Barbosa<sup>2</sup>, António Salgado<sup>2</sup>, Jana B. Nieder<sup>1</sup>

<sup>1</sup>INL - International Iberian Nanotechnology Laboratory, Ultrafast Bio- and Nanophotonics group, Av. Mestre José Veiga s/n, Braga, Portugal. <sup>2</sup>ICVS - Life and Health Sciences Research Institute (ICVS), School of Medicine, University of Minho, Campus de Gualtar, Braga, Portugal.

5.98

**Unraveling Eumelanin Radical Formation by Nanodiamond Optical Relaxometry in a Living Cell**

Qi Lu<sup>1</sup>, Berlind<sup>1</sup>, Zhenyu<sup>2,3,4</sup>, Priyadharshini<sup>5</sup>, Maabur<sup>5</sup>, Carla<sup>1</sup>, Raul<sup>5</sup>, Ingo<sup>1</sup>, Robert<sup>1</sup>, Fedor<sup>5</sup>, Martin<sup>2</sup>, Yingke<sup>1</sup>, Tanja Weil<sup>1</sup>

<sup>1</sup>Max Planck Institute for Polymer Research, Ackermannweg 10, Mainz, Germany. <sup>2</sup>Institute of Theoretical Physics and Center for Integrated Quantum Science and Technology (IQST), Ulm University, Albert-Einstein-Allee 11, Ulm, Germany. <sup>3</sup>Key Laboratory of Atomic and Subatomic Structure and Quantum Control (Ministry of Education), and School of Physics, South China Normal University, Guangzhou, China. <sup>4</sup>Guangdong Provincial Key Laboratory of Quantum Engineering and Quantum Materials, and Guangdong-Hong Kong Joint Laboratory of Quantum Matter, South China Normal University, Guangzhou, China. <sup>5</sup>Institute for Quantum Optics and Center for Integrated Quantum Science and Technology (IQST), Ulm University, Albert-Einstein-Allee 11, Ulm, Germany.

5.99

**Radiation tolerance of diamond detector with 68 MeV protons: flux and fluence studies**

R. Molle<sup>1</sup>, M-L. Gallin-Martel<sup>1</sup>, C. Koumeir<sup>3</sup>, D. Dauvergne<sup>1</sup>, P. Everaere<sup>1,4</sup>, L. Gallin-Martel<sup>1</sup>, A. Guertin<sup>2</sup>, F. Haddad<sup>3</sup>, C. Hoarau<sup>1</sup>, F. Lafont<sup>4</sup>, J. Livingstone<sup>1</sup>, V. Metivier<sup>2</sup>, J-F Muraz<sup>1</sup>, F. Poirier<sup>3</sup>, F. Rarbi<sup>1</sup>, N. Servagent<sup>2</sup>

<sup>1</sup>Univ. Grenoble Alpes, CNRS/IN2P3 Laboratoire de Physique Subatomique et Cosmologie (LPSC), 53 Av. des Martyrs, 38000 Grenoble, France. <sup>2</sup>Univ. Nantes, SUBATECH, 4 rue Alfred Kastler, 44 307 Nantes Cedex 3, France. <sup>3</sup>ARRONAX, 1 rue Aronnax, 44800 Saint Herblain, France. <sup>4</sup>European Synchrotron Radiation Facility, 71 avenue des Martyrs, 38000 Grenoble, France.

5.100

**Modelling a Diamond-Based Radiation Detector for Beta Particles from Tritium**

Sophie E Osbourne

School of Physics, University of Bristol, HH Wills Physics Laboratory, Tyndall Avenue, Bristol UK, BS8 1TL.

5.101

**Performance of a scCVD particle detector operated at cryogenic temperatures in radiation harsh environments**

Karla Ivanković Nizić<sup>1</sup>, Georgios Provas<sup>1</sup>, Donny Cosic<sup>1</sup>, Milko Jakšić<sup>1</sup>, Milan Vićentijević<sup>1</sup>, Michal Pomorski<sup>2</sup>

<sup>1</sup>Ruder Boskovic Institute, Bijenička cesta 54, Zagreb, Croatia. <sup>2</sup>Universite Paris-Saclay, CEA, List, Palaiseau, F-91120, France.

5.102

**Diamond Sensors for Pulse-Resolved Measurements of High Energy X-rays at European XFEL**

Tuba Çonka Yıldız<sup>1</sup>, Wolfgang Freund<sup>1</sup>, Jia Liu<sup>1</sup>, Matthias Schreck<sup>2</sup>, Dmitry Khakhulin<sup>3</sup>, Hazem Yousef<sup>3</sup>, Peter Zalden<sup>3</sup>, Christopher Milne<sup>3</sup> and Jan Grünert<sup>1</sup>

<sup>1</sup>XPD, European XFEL, Holzkoppel 4, 22869, Schenefeld, Germany. <sup>2</sup>Department of Physics, University of Augsburg, Universitätsstr. 1, 86159, Augsburg, Germany. <sup>3</sup>FXE, European XFEL, Holzkoppel 4, 22869, Schenefeld, Germany.

5.103

**Patterning and Structuring of CVD Diamond by Catalytic Etching Using Nickel**

Anjana Wijesekara<sup>1</sup>, Saffron Tyler<sup>1</sup>, Daniel Field<sup>2</sup>, Ben L. Green<sup>1</sup>, Mark E. Newton<sup>1</sup>

<sup>1</sup>Department of Physics, University of Warwick, Coventry, CV4 7AL, United Kingdom. <sup>2</sup>Element Six (UK) Ltd., Global Innovation Centre, Didcot, OX11 0QR, United Kingdom.

5.104

**Electron Beam-Induced Etching of Single Crystal Diamond: effect of atmosphere**

M. Régnier<sup>1,2</sup>, D.D. Tran<sup>1,2</sup>, F. Donatini<sup>1</sup>, E. Gheeraert<sup>1,2</sup>

<sup>1</sup>Institut Neel, CNRS, Grenoble INP, Univ. Grenoble Alpes, 38000 Grenoble, France. <sup>2</sup>Institute of Applied Physics, Faculty of Pure and Applied Sciences, University of Tsukuba, Tsukuba 305-8573, Japan.

5.105

**Vertical 1kV deep depletion diamond MOSFET: optimization and compact model**

Nicolas Rouger<sup>1</sup>, Marine Couret<sup>1</sup>, Ralph Makhoul<sup>1</sup>, Juliette Letellier<sup>2</sup>, Julien Pernot<sup>3</sup>

<sup>1</sup>Université de Toulouse, LAPLACE, CNRS, UPS, INPT, F-31071 Toulouse, France. <sup>2</sup>DIAMFAB, 38000, Grenoble, France. <sup>3</sup>Université Grenoble Alpes, Grenoble INP, Institut Néel, 38000, Grenoble, France.

5.106

**New optical gate configuration for FET device**

J.L. Cruces<sup>1</sup>, F. Lloret<sup>2</sup>, G. Alba<sup>1</sup>, R. Alcántara<sup>3</sup>, J. Navas<sup>3</sup>, D. Eon<sup>4</sup>, R. Rouzbahani<sup>5</sup>, K. Haenen<sup>5</sup>, D.Araujo<sup>1</sup>

<sup>1</sup>Departament of Materials Science and Metallurgical Engineering and Inorganic Chemistry. University of Cádiz, 11510, Puerto real, Spain. <sup>2</sup>Departament of Applied of Physics. University of Cádiz, 11510, Puerto real, Spain. <sup>3</sup>Departament of Physical Chemistry. University of Cádiz, 11510, Puerto real, Spain. <sup>4</sup>Institut Néel, CNRS, Grenoble INP. University of Grenoble Alpes, 38000, Grenoble, France. <sup>5</sup>Institute for Materials Research (IMO), Hasselt University, & IMOMECE, IMEC vzw, 3590 Diepenbeek, Belgium.

5.107

**Proposal of inversion channel diamond MOSFET with drift layer-free for low-loss and high-voltage**

Tsubasa Matsumoto<sup>1,2</sup>, Kai Sato<sup>2</sup>, Yuto Nakamura<sup>2</sup>, Toshiharu Makino<sup>3</sup>, Hiromitsu Kato<sup>3</sup>, Masahiko Ogura<sup>3</sup>, Traore Aboulayé<sup>4</sup>, Kimiyoshi Ichikawa<sup>1</sup>, Kan Hayashi<sup>1,2</sup>, Takako Inokuma<sup>2</sup>, Satoshi Yamasaki<sup>1</sup>, Norio Tokuda<sup>1,2</sup>

<sup>1</sup>Nanomaterials Research Institute, Kanazawa University, Kakuma-machi, Kanazawa, Japan. <sup>2</sup>Graduate School of Natural Science and Technology, Kanazawa University, Kakuma-machi, Kanazawa, Japan. <sup>3</sup>Advanced Power Electronics Research Center, AIST, 1-1-1 Umezono, Tsukuba, Japan. <sup>4</sup>Graduate School of Pure and Applied Sciences, University of Tsukuba, 1-1-1 Tennodai, Tsukuba, Japan.

5.108

**Study of GaN-HEMTs with a diamond for high power applications**

Mourad Kaddeche<sup>1</sup>, Zine Eddine KADDECHE<sup>2</sup>

<sup>1</sup>Department of Technology, Faculty of Science and Technology, Djilali Bounaama University of Khemis Miliana, Route theniet elhad, 44225 Ain Defla, Algeria. <sup>2</sup>Faculty of E.A.S, Bilecik Şeyh Edebali University, 11230 Bilecik Merkez, Bilecik, Türkiye.

5.109

**Deep level transient spectroscopy and hole injection used to investigate deep traps in lightly doped diamond layer**

Philippe Ferrandis<sup>1</sup>, Jesus Canas Fernandez<sup>1</sup>, Julien Bassaler<sup>1</sup>, Martin Kah<sup>1</sup>, Julien Pernot<sup>1</sup>, David Eon<sup>1</sup>

<sup>1</sup>Université Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000 Grenoble, France.



5.110

**Defects studies on Schottky barrier diode by Electron Beam Induced Current for beta-voltaic applications**

H. Ribeiro<sup>1,2</sup>, M. Jacquemin<sup>1</sup>, G. Jacopin<sup>2</sup>

<sup>1</sup>DIAMFAB, 25 avenue des martyrs, 38042 Grenoble, France. <sup>2</sup>Institut Néel CNRS, Univ. Grenoble Alpes, 38042, Grenoble, France.

5.111

**Numerical simulations on thermally stimulated current (TSC) measurements**

Maximilian Bosak, Theodor Peter, Theodor Grünwald, Matthias Schreck

University of Augsburg, Institute of Physics, D-86135 Augsburg (Germany)

5.112

**Charge carrier transport in graphene/diamond hybrids**

S. Majdi<sup>1</sup>, R. Yamazaki<sup>1</sup>, A. Aitkulova<sup>1</sup>, N. Suntornwipat<sup>1</sup>, J. Isberg<sup>1</sup>

<sup>1</sup>Division of Electricity, Department of Electrical Engineering, Uppsala University, Box 65, 751 03, Uppsala, Sweden.

5.113

**Increased Hall mobility in graphene-on-diamond**

Aisuloo Aitkulova<sup>1</sup>, Nattakarn Suntornwipat<sup>1</sup>, Saman Majdi<sup>1</sup>, Jan Isberg<sup>1</sup>

<sup>1</sup>Division of Electricity, Department of Electrical Engineering, Uppsala University, Box 65, 751 03, Uppsala, Sweden.

5.114

**Photon-induced conductivity enhancement in N- P- co-doped polycrystalline diamond layers**

A. Freire de Rivas<sup>1</sup>, F. Lloret<sup>2</sup>, M. Domínguez<sup>3</sup>, K.J. Sankaran<sup>4</sup>, K. Haenen<sup>5,6</sup>, Daniel Araujo<sup>1</sup>

<sup>1</sup>Department of Materials Sciences, University of Cadiz, 11510, Puerto Real, Spain. <sup>2</sup>Department of Applied Physics, University of Cadiz, 11510, Puerto Real, Spain. <sup>3</sup>Department of Condensed Matter Physics, University of Cadiz, 11510, Puerto Real, Spain. <sup>4</sup>CSIR-Institute of Minerals and Materials Technology, BBSR, 751013, Odisha, India. <sup>5</sup>Institute for Materials Research (IMO), Hasselt University, 3590 Diepenbeek, Belgium. <sup>6</sup>IMOMECE, IMEC vzw, 3590 Diepenbeek, Belgium.

5.115

**Cryogenic EBID for the fabrication of diamond-metal contacts**

J. Valendorf<sup>1</sup>, J.C. Piñero<sup>2</sup>, G. Alba<sup>1</sup>, F. Lloret<sup>3</sup>, D. Araujo<sup>1</sup>

<sup>1</sup>Department of Materials Science and Metallurgical Engineering and Inorganic Chemistry. University of Cadiz, 11510, Puerto Real, Spain. <sup>2</sup>Department of Didactics, section of Mathematics. University of Cadiz, 11510, Puerto Real, Spain. <sup>3</sup>Department of Applied Physics. University of Cadiz, 11510, Puerto Real, Spain.

5.116

**Influence of the interfacial carbide formation for ohmic behaviour unveiled on semiconducting diamond**

J. Valendorf<sup>1</sup>, J.C. Piñero<sup>2</sup>, G. Alba<sup>1</sup>, F. Lloret<sup>3</sup>, D. Araujo<sup>1</sup>

<sup>1</sup>Department of Materials Science and Metallurgical Engineering and Inorganic Chemistry. University of Cádiz, 11510, Puerto Real, Spain. <sup>2</sup>Department of Didactics, section of Mathematics. University of Cádiz, 11510, Puerto Real, Spain. <sup>3</sup>Department of Applied Physics. University of Cádiz, 11510, Puerto Real, Spain.

5.117

**Investigating the Effect of Nitrogen on the Structural and Electrical Properties of Phosphorus and Nitrogen Co-doped Nanocrystalline Diamond**

Essraa Ahmed<sup>1,2</sup>, Rozita Rouzbahani<sup>1,2</sup>, Paulius Pobedinskas<sup>1,2</sup>, Nianjun Yang<sup>1,2</sup>, Ken Haenen<sup>1,2</sup>

<sup>1</sup>Institute for Materials Research (IMO), Hasselt University, 3590 Diepenbeek, Belgium. <sup>2</sup>IMOMECE, IMEC vzw, 3590 Diepenbeek, Belgium.

5.118

**Towards High-Resolution Magnetic Resonance Imaging Combined Scanning Probe Technique and NV centers in Diamond**

Raúl González Brouwer<sup>1</sup>, Berndt Koslowski<sup>1</sup>, Fedor Jelezko<sup>1</sup>

<sup>1</sup>Institute for Quantum Optics, Ulm University, Albert-Einstein-Allee 11, 89081 Ulm, Germany.

5.119

### Growth of lightly phosphorus-doped single crystal diamond on (111) oriented substrates

Felix Hoffmann<sup>1</sup>, Nicola Lang<sup>1</sup>, Philip Schätzle<sup>1</sup>, Philipp Reinke<sup>2</sup>, Vincent Mortet<sup>2</sup>, Lutz Kirste<sup>1</sup>, Patrik Straňák<sup>1</sup>, Patricia Quellmalz<sup>1</sup>, Peter Knittel<sup>1</sup> and Volker Cimalla<sup>1</sup>

<sup>1</sup>Fraunhofer Institute for Applied Solid State Physics, Tullastraße 72, D-79108 Freiburg, Germany. <sup>2</sup>Quantum Brilliance GmbH, Industriestraße 4, D-70565 Stuttgart, Germany.

20:00 Closing Day 1 “Hasselt Diamond Workshop 2024 – SBDD XXVIII”.

## Thursday, February 29, 2024

### Session 6

#### Nanodiamond and Surfaces

Chair: **Oliver A. Williams, Cardiff University, U.K.**

09:00

6.1 (Invited)

#### Transmission electron microscopy and spectroscopy for high spatial resolution color center detection and correlation

Shery L. Y. Chang<sup>1,2</sup>, Haotian Wen<sup>2</sup>, Christian Dwyer<sup>3</sup>

<sup>1</sup>Electron Microscope Unit, Mark Wainwright Analytical Center, University of New South Wales, Sydney, Australia. <sup>2</sup>School of Materials Science and Engineering, University of New South Wales, Sydney, Australia. <sup>3</sup>Electron Imaging and Spectroscopy Tools, Sans Souci, Australia.

09:30

6.2

#### Fluorescence Lifetime of Nanodiamonds for Intracellular Thermometry

Filipe Camarinho<sup>1</sup>, Beatriz Costa<sup>1</sup>, Miguel Ferreira-Cao<sup>1</sup>, Jana B. Nieder<sup>1</sup>

<sup>1</sup>INL – International Iberian Nanotechnology Laboratory, Ultrafast Bio- and Nanophotonics group, Av. Mestre José Veiga s/n, Braga, Portugal.

09:50

6.3

#### A multifunctional cascade nanoreactor based on Fe decorated nanodiamond for enhancing chemodynamic/starvation Therapy for tumor hypoxia

Rajakar Selvam<sup>1</sup>, Elena Prevedentseva<sup>1,2</sup>, Artashes Karmenyan<sup>1</sup>, Chia-Liang Cheng<sup>1</sup>

<sup>1</sup>Department of Physics, National Dong Hwa University, Hualien, Taiwan. <sup>2</sup>P.N. Lebedev Physics Institute of Russian Academy of Science, Moscow, 119991, Russia.

10:10

6.4

#### Utilizing electrons from diamond surfaces: Photocatalytic dehalogenation of aromatic compounds using nanodiamond

Tobias Karl<sup>1</sup>, Johannes Ackermann<sup>2</sup>, Rocio B. Rodriguez<sup>2</sup>, Burkhard König<sup>1</sup>, Anke Krueger<sup>2</sup>

<sup>1</sup>Institute of Organic Chemistry, University of Regensburg, Universitätsstraße 31, Regensburg, Germany. <sup>2</sup>Institute of Organic Chemistry, University of Stuttgart, Pfaffenwaldring 55, Stuttgart, Germany.

10:30 Coffee Break (Grand Banquet Hall)

### Session 7

#### Diamond Growth

Chair: **Paul W. May, University of Bristol, U.K.**

11:10

7.1

#### Hydrogen incorporation in nitrogen-doped CVD diamond

Tokuyuki Teraji<sup>1</sup>, Chikara Shinei<sup>1</sup>, Yuta Masuyama<sup>2</sup>

<sup>1</sup>National Institute for Materials Science, 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan. <sup>2</sup>National Institutes for Quantum Science and Technology, Takasaki, Gunma 370-1292, Japan.

**11:30**

7.2

**Investigation on the mechanisms at the origin of reduction of the emerging dislocation density in W-doped diamond layer**

Dov Zvi Nusimovici<sup>1,2</sup>, Thu-Nhi Tran Caliste<sup>3</sup>, José Baruchel<sup>3</sup>, David Eon<sup>4</sup>, Jessica Bousquet<sup>1</sup>, Didier Chaussende<sup>2</sup>

<sup>1</sup>DIAMFAB, 25 avenue des Martyrs, 38042 Grenoble, France. <sup>2</sup>Univ. Grenoble Alpes, CNRS, Grenoble INP, SIMaP, 38000 Grenoble, France. <sup>3</sup>ESRF, 71 avenue des Martyrs, 38043 Grenoble, France. <sup>4</sup>Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000 Grenoble, France.

**11:50**

7.3

**Synthesis of single crystal diamond films using a distributed antenna array microwave system**

Chaimaa Mahi<sup>1</sup>, Alexandra Oliveira<sup>1</sup>, Ovidiu Brinza<sup>2</sup>, Riadh Issaoui<sup>1</sup>, Alexandre Tallaire<sup>2,3</sup>, Jocelyn Achard<sup>1</sup>, Fabien Bénédic<sup>1</sup>

<sup>1</sup>Université Sorbonne Paris Nord, LSPM, CNRS, UPR 3407, Villetaneuse, France. <sup>2</sup>LSPM, CNRS, UPR 3407, Université Sorbonne Paris Nord, Villetaneuse, France. <sup>3</sup>Institut de Recherche de Chimie Paris, Chimie ParisTech, CNRS, PSL Research University, Paris, France.

**12:10**

7.4

**Synthesis of P-doped diamond using tert-butyl phosphine toward the high sensitivity quantum sensor of the NV center**

Riku Kawase<sup>1</sup>, Hiroyuki Kawashima<sup>1</sup>, Hiromitsu Kato<sup>2</sup>, Norio Tokuda<sup>3</sup>, Satoshi Yamasaki<sup>3</sup>, Masahiko Ogura<sup>2</sup>, Toshiharu Makino<sup>2</sup>, Norikazu Mizuochi<sup>1,4</sup>

<sup>1</sup>Institute for Chemical Research, Kyoto University, Gokasho, Uji, Kyoto 611-0011, Japan. <sup>2</sup>National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Ibaraki 305-8568, Japan. <sup>3</sup>Graduate School of Natural Science and Technology, Kanazawa University, Kanazawa, Ishikawa 920-1192, Japan.

**12:30 Lunch (Grand Banquet Hall) + Joint Committees Meeting (Fluistertuin)**

**Session 8**

**Quantum Sensing II**

Chair: **Miloš Nešlák**, Hasselt University & IMEC vzw, Belgium

**14:00**

8.1 (Invited)

**Diamond sensing of magnetic transitions and fluctuations of nanoparticles**

Ren-Bao Liu

Department of Physics, Centre for Quantum Coherence, The Hong Kong Institute of Quantum Information Science and Technology, and New Cornerstone Science Laboratory, The Chinese University of Hong Kong.

**14:30**

8.2

**Towards low-noise magnetic sensing with tin-vacancy centers in diamond**

Gesa Welker<sup>1</sup>, Yufan Li<sup>1</sup>, Richard Norte<sup>1,2</sup> and Toeno van der Sar<sup>1</sup>

<sup>1</sup>Department of Quantum Nanoscience, Kavli Institute of Nanoscience, Delft University of Technology, Delft, The Netherlands.

<sup>2</sup>Department of Precision and Microsystems Engineering, Faculty of Mechanical, Maritime and Materials Engineering, Delft University of Technology, Delft, The Netherlands.

**14:50**

8.3

**Cavity-free room temperature magnetometry using singlet absorption of NV centers in diamond**

Ali Tayefeh Younesi<sup>1</sup>, Muhib Omar<sup>2,3</sup>, Arne Wickenbrock<sup>2,3</sup>, Dmitry Budker<sup>2,3,4</sup>, Ronald Ulbricht<sup>1</sup>

<sup>1</sup>Max Planck Institute for Polymer Research, Ackermannweg 10, 55128 Mainz, Germany. <sup>2</sup>Helmholtz-Institut Mainz, GSI

Helmholtzzentrum für Schwerionenforschung GmbH, 55128 Mainz, Germany. <sup>3</sup>Johannes Gutenberg-Universität Mainz, 55128 Mainz, Germany. <sup>4</sup>Department of Physics, University of California, Berkeley, California 94720-300, USA.

**15:10**

8.4

**In-plane strain distribution in HPHT diamond detected by ODMR of NV- centers**

Chikara Shinei<sup>1</sup>, Yuta Masuyama<sup>2</sup>, Hiroshi Abe<sup>2</sup>, Masashi Miyakawa<sup>1</sup>, Takashi Taniguchi<sup>1</sup>, Takeshi Ohshima<sup>2</sup>, Tokuyuki Teraji<sup>1</sup>

<sup>1</sup>National Institute for Materials Science, 1-1 Namiki, Tsukuba, Ibaraki, 305-0044, Japan. <sup>2</sup>National Institutes for Quantum Science and Technology, Takasaki, Gunma 370-1292, Japan.

## Session 9

### Posters II & Coffee Break

Chairs: [Jocelyn Achard](#); [Shery L.Y. Chang](#); [Anke Krueger](#); [Boris Naydenov](#)

15:30 – 17:00 (Grand & Small Banquet Hall)

For a detailed list of posters, see [Session 5](#).

## Session 10

### Nuclear Spin Memories

Chair: [Fazhan Shi](#), [University of Science and Technology of China, China](#)

17:00

10.1 (Invited)

#### Germanium-Vacancy in diamond as quantum memory exceeding 20ms

[Katharina Senkalla](#)<sup>1</sup>, [Genko Genov](#)<sup>1</sup>, [Mathias H. Metsch](#)<sup>1</sup>, [Petr Siyushev](#)<sup>1,2,3</sup>, [Fedor Jelezko](#)<sup>1</sup>

<sup>1</sup>*Institute for Quantum Optics, Ulm University, Albert-Einstein-Allee 11, 89081 Ulm, Germany*

<sup>2</sup>*3rd Institute of Physics, Center for Applied Quantum Technologies University of Stuttgart, Stuttgart, Germany*

<sup>3</sup>*Institute for Materials Research (IMO), Hasselt University, Wetenschapspark 1, B-3590 Diepenbeek, Belgium*

17:30

10.2

#### Novel methodology for Quantum State Tomography, accessing 0.9995 fidelity two qubit electron-nuclear spin gates

[Abhishek Shukla](#)<sup>1</sup>, [Boo Carmans](#)<sup>1</sup>, [Michael Petrov](#)<sup>1</sup>, [Daan Vrancken](#)<sup>1</sup>, [Milos Nesladek](#)<sup>1</sup>

<sup>1</sup>*Quantum Science and Technology, IMO-IMOMEC, Wetenschapspark 1, Diepenbeek, België*

17:50

10.3

#### Ab-initio theory of nuclear spin flip processes within NV center of diamond via orbital degrees of freedom

[Gergő Thiering](#)<sup>1</sup>, [Richard Monge](#)<sup>3,4</sup>, [Tom Delord](#)<sup>3</sup>, [Carlos A. Meriles](#)<sup>3,4</sup>, [Adam Gali](#)<sup>1,2</sup>

<sup>1</sup>*HUN-REN Wigner Research Centre for Physics, Budapest, Hungary.* <sup>2</sup>*Department of Atomic Physics, Budapest University of Technology and Economics, Budapest, Hungary* <sup>3</sup>*Department of Physics, CUNY-City College of New York, New York, New York 10031, USA* <sup>4</sup>*CUNY-Graduate Center, New York, New York 10016, USA.*

18:10 **Closing Day 2 “Hasselt Diamond Workshop 2024 – SBDD XXVIII”.**

20:00 **Conference Dinner at the *Ravel & De Boulevard* of the *Holiday Inn*.**

## Friday, March 1, 2024

### Session 11

#### Diamond Device Technology II

Chair: **M. Pilar Villar, Universidad de Cádiz, Spain**

**09:30**

11.1 (Invited)

#### Polycrystalline Diamond Micro-Hotplates

Evan L. H. Thomas<sup>1</sup>, Jaspa Stritt<sup>1</sup>, Soumen Mandal<sup>1</sup>, Matthias Imboden<sup>2</sup>, Oliver A. Williams<sup>1</sup>

<sup>1</sup>School of Physics and Astronomy, Cardiff University, Queen's Buildings, The Parade, Cardiff, UK. <sup>2</sup>4K-MEMS SA, St Blaise, Switzerland.

**10:00**

11.2

#### Sawfish photonic crystal cavities with Q-factors of several thousand

Marco E. Stucki<sup>1,2</sup>, Tommaso Pregolato<sup>1,2</sup>, Julian M. Bopp<sup>1,2</sup>, Maarten H. v. d. Hoeven<sup>2</sup>, Alok

Gokhale<sup>2</sup>, Olaf Krüger<sup>1</sup>, Tim Schröder<sup>1,2</sup>

<sup>1</sup>Ferdinand-Braun-Institut gGmbH, Leibniz-Institut für Höchstfrequenztechnik, Gustav-Kirchhoff-Str. 4, 12489

Berlin, Germany. <sup>2</sup>Department of Physics, Humboldt-Universität zu Berlin, Newtonstr. 15, 12489 Berlin, Germany.

**10:20**

11.3

#### Microwave dielectric resonator for the quality control of freestanding diamond plates

Jerome A. Cuenca<sup>1</sup>, Soumen Mandal<sup>1</sup>, Jaspa Stritt<sup>1</sup>, Xiang Zheng<sup>2</sup>, James Pomeroy<sup>2</sup>, Martin Kuball<sup>2</sup>, Adrian Porch<sup>3</sup>, Oliver A. Williams<sup>1</sup>

<sup>1</sup>School of Physics and Astronomy, Cardiff University, Cardiff, CF24 3AA, United Kingdom. <sup>2</sup>University of Bristol, Bristol, BS8 1TL, United Kingdom. <sup>3</sup>School of Engineering, Cardiff University, Cardiff, CF24 3AA, United Kingdom.

**10:40**

11.4

#### Inkjet printing-manufactured boron-doped diamond chip electrodes for electrochemical sensing purposes

Zhichao Liu<sup>1</sup>, Simona Baluchová<sup>1</sup>, Bob Brocken<sup>1</sup>, Essraa Ahmed<sup>2,3</sup>, Paulius Pobedinskas<sup>2,3</sup>, Ken Haenen<sup>2,3</sup>, Josephus G. Buijnsters<sup>1</sup>

<sup>1</sup>Precision and Microsystems Engineering, Delft University of Technology, 2628 CD Delft, the Netherlands. <sup>2</sup>Institute for Materials Research (IMO), Hasselt University, 3590 Diepenbeek, Belgium. <sup>3</sup>IMOMECA, IMEC vzw, 3590 Diepenbeek, Belgium.

**11:00 Coffee Break (Grand Banquet Hall)**

### Session 12

#### Diamond Devices II

Chair: **David A.J. Moran, University of Glasgow, U.K.**

**11:30**

12.1

#### High quality Al<sub>2</sub>O<sub>3</sub>/(111) (OH)-terminated diamond interface for MOSFETs fabrication

Pietro Argenton<sup>1</sup>, Martin Kah<sup>1</sup>, Marine Couret<sup>2</sup>, Nicolas Rouger<sup>2</sup>, David Eon<sup>1</sup>, Julien Pernot<sup>1</sup>

<sup>1</sup>Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, 38000 Grenoble, France. <sup>2</sup>Université de Toulouse, LAPLACE, CNRS, INPT, UPS, F-31071 Toulouse, France.

**11:50**

12.2

#### Development of monolithic diamond capacitors for high voltage applications

Michal Pomorski<sup>1</sup>, Larry Buffle<sup>2</sup>, Cyrille Laviron<sup>3</sup>, Baptiste Truffet<sup>1</sup>, Frederic Voiron<sup>2</sup>

<sup>1</sup>Université Paris-Saclay, CEA, LIST, F-9112, Palaiseau, France. <sup>2</sup>Murata Integrated Passive Solutions, 14000, Caen, France. <sup>3</sup>CEA-LETI, Grenoble, France.

12:10

12.3

### **Laser-written All-carbon Transistors in Diamond**

Calum Henderson<sup>1</sup>, Marta Krueger<sup>2</sup>, Emil Jonasson<sup>3</sup>, Patrick Salter<sup>2</sup>, Richard B. Jackman<sup>1</sup>

<sup>1</sup>London Centre for Nanotechnology and the Department of Electronic and Electrical Engineering, UCL (University College London), 17-19 Gordon Street, London, WC1H 0AH, UK. <sup>2</sup>Department of Engineering Science, University of Oxford, Parks Road, Oxford OX1 3PJ, UK. <sup>3</sup>Remote Applications in Challenging Environments (RACE), UK Atomic Energy Authority, Culham Campus, Abingdon, UK.

12:30

12.4

### **Experimental Evidence for Large Negative Electron Affinity from Scandium-Terminated Diamond**

Ramiz Zulkharnay, Paul W. May

School of Chemistry, University of Bristol, Bristol BS8 1TS, United Kingdom.

12:50 Lunch (Grand Banquet Hall)

## **Session 13**

### **Physics of Colour Centres**

Chair: **Tokuyuki Teraji, National Institute for Materials Science (NIMS), Japan**

14:10

13.1

### **Drift force around dislocations affecting the luminescence quantum efficiency of excitons in CVD diamond**

Daiki Totsuka<sup>1</sup>, Kazuki Konishi<sup>1</sup>, Rintaro Toda<sup>1</sup>, Jan Isberg<sup>2</sup>, Nobuko Naka<sup>1</sup>

<sup>1</sup>Department of Physics, Kyoto University, Kyoto 606-8502, Japan. <sup>2</sup>Department of Electrical Engineering, Uppsala University, Box 65, S-751 03, Uppsala, Sweden.

14:30

13.2

### **Ultrafast optoelectronic charge state switching of silicon vacancies in diamond**

Manuel Rieger<sup>1</sup>, Viviana Villafañe<sup>1,2</sup>, Lina M. Todenhagen<sup>1</sup>, Stephan Matthies<sup>2</sup>, Stefan Appel<sup>2</sup>, Martin S. Brandt<sup>1</sup>, Kai Müller<sup>2</sup>, Jonathan J. Finley<sup>1</sup>

<sup>1</sup>Walter Schottky Institute, School of Natural Sciences and MCQST, Technical University of Munich, 85748 Garching, Germany. <sup>2</sup>Walter Schottky Institute, School of Computation, Information and Technology and MCQST, Technical University of Munich, 85748 Garching, Germany.

14:50

13.3

### **Electrical excitation of color centers in phosphorus-doped diamond**

Florian Sledz<sup>1</sup>, Igor A. Khramtsov<sup>2</sup>, Assegid M. Flatae<sup>1</sup>, Stefano Lagomarsino<sup>3</sup>, Shannon S. Nicley<sup>4,5</sup>, Rozita Rouzbahani<sup>4</sup>, Paulius Pobedinskas<sup>4</sup>, Ken Haenen<sup>4</sup>, Tianxiao Guo<sup>6</sup>, Xin Jiang<sup>6</sup>, Paul Kienitz<sup>7</sup>, Peter Haring Bolivar<sup>7</sup>, Dmitry Yu. Fedyanin<sup>1,2</sup>, Mario Agio<sup>1,8</sup>

<sup>1</sup>Laboratory of Nano-Optics, University of Siegen, Germany. <sup>2</sup>Laboratory of Nanooptics and Plasmonics, Moscow Institute of Physics and Technology, Russian Federation. <sup>3</sup>Istituto Nazionale di Fisica Nucleare, Sezione di Firenze, Italy. <sup>4</sup>Institute for Material Research (IMO) & IMOMECE, Hasselt University & IMEC vzw, Belgium. <sup>5</sup>Department of Electrical and Computer Engineering, Michigan State University, USA. <sup>6</sup>Lehrstuhl für Oberflächen- und Werkstofftechnologien, University of Siegen, Germany. <sup>7</sup>Group of Graphene-based Nanotechnology, University of Siegen, Germany. <sup>8</sup>National Institute of Optics (INO), National Research Council (CNR), Italy.

15:10

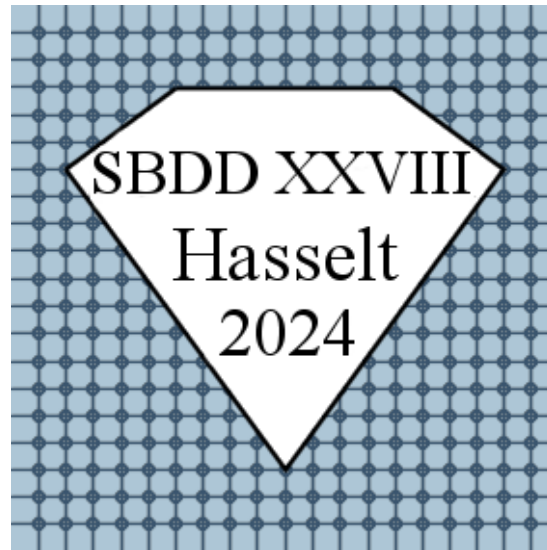
13.4

### **Low Earth Orbit Mission Results of the OSCAR-QUBE Integrated Diamond-based Quantum Sensor**

Yarne Beerden<sup>1</sup>, Siemen Achten<sup>1</sup>, Musa Aydogan<sup>1</sup>, Sam Bammens<sup>1</sup>, Sofie Bammens<sup>1</sup>, Daphne Box<sup>1</sup>, Boo Carmans<sup>1</sup>, Jeffrey Gorissen<sup>1</sup>, Teoman Köseoglu<sup>1</sup>, Dries Hendriks<sup>1</sup>, Jens Mannaerts<sup>1</sup>, Remy Vandebosch<sup>1</sup>, Siemen Vandervoort<sup>1</sup>, Sebastiaan Vanspauwen<sup>1</sup>, Anna Ermakova<sup>1,2</sup>, Milos Nesladek<sup>1,3</sup>, Jaroslav Hruby<sup>1,3</sup>

<sup>1</sup>Institute for Materials Research (IMO), Hasselt University, Wetenschapspark 1, B-3590 Diepenbeek, Belgium <sup>2</sup>Belgian Institute for Space Aeronomy (BIRA-IASB), Ringlaan 3, B-1180 Brussels, Belgium. <sup>3</sup>IMOMECE Division, IMEC, Wetenschapspark 1, B-3590 Diepenbeek, Belgium.

15:30 Closing “Hasselt Diamond Workshop 2024 – SBDD XXVIII”.



Workshop sponsored by [Seki Diamond Systems](#), [Diatope](#), [MUEGGE](#), [Qnami](#), [HiQuTe Diamond](#), [Mintres](#), [Orbray](#), [Diamfab](#), [Konfidi](#), and [Hasselt University](#) via the [Institute for Materials Research \(IMO-IMOMECC\)](#).

# HASSELT DIAMOND WORKSHOP 2024 – SBDD XXVIII

## Tuesday, February 27, 2024

18:00 – 19:00 Registration at the *Express by Holiday Inn* & Reception

## Wednesday, February 28, 2024

08:20 – 08:50 Registration at the *cultuurcentrum Hasselt*.

08:50 – 09:00 Opening “Hasselt Diamond Workshop 2024 – SBDD XXVIII”.

09:00 – 10:10 **Session 1**  
**Diamond Device Technology**  
Chair: **Ken Haenen, Hasselt University & IMEC vzw, Belgium**

10:10 – 10:50 Coffee Break (Grand Banquet Hall)

10:50 – 12:20 **Session 2**  
**Diamond Quantum Technology**  
Chair: **Christoph Becher, Universität des Saarlandes, Germany**

12:30 SBDD XXVIII group photo (Front entrance ccHa)

12:40 – 14:20 Lunch (Grand Banquet Hall)

14:20 – 15:50 **Session 3**  
**Quantum Sensing I**  
Chair: **Quan Li, The Chinese University of Hong Kong, Hong Kong**

15:50 – 16:30 Coffee Break (Grand Banquet Hall)

16:30 – 18:00 **Session 4**  
**Diamond Devices I**  
Chair: **Jan Isberg, Uppsala University, Sweden**

18:00 – 20:00 **Session 5**  
Posters I & Reception sponsored by:   
Chairs: **Jocelyn Achard, Université Sorbonne Paris Nord, France; Shery L.Y. Chang, University of New South Wales, Australia; Anke Krueger, Universität Stuttgart, Germany; Boris Naydenov, Helmholtz-Zentrum Berlin (HZB), Germany**

20:00 Closing Day 1 “Hasselt Diamond Workshop 2024 – SBDD XXVIII”.

## Thursday, February 29, 2024

09:00 – 10:30 **Session 6**  
**Nanodiamond & Surfaces**  
Chair: **Oliver A. Williams, Cardiff University, U.K.**

10:30 – 11:10 Coffee Break (Grand Banquet Hall)

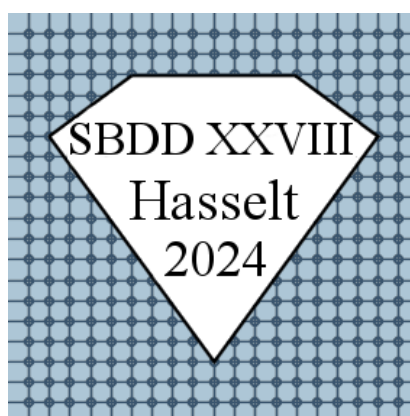
11:10 – 12:30 **Session 7**  
**Diamond Growth**  
Chair: **Paul W. May, University of Bristol, U.K.**



12:30 – 14:00	Lunch (Grand Banquet Hall)
14:00 – 15:30	<b>Session 8</b> <b>Quantum Sensing II</b> Chair: <a href="#">Miloš Nesládek, Hasselt University &amp; IMEC vzw, Belgium</a>
15:30 – 17:00	<b>Session 9</b> <b>Posters II</b> Chairs: <a href="#">Jocelyn Achard</a> ; <a href="#">Shery L.Y. Chang</a> ; <a href="#">Anke Krueger</a> ; <a href="#">Boris Naydenov</a>
17:00– 18:10	<b>Session 10</b> <b>Nuclear Spin Memories</b> Chair: <a href="#">Fazhan Shi, University of Science and Technology of China, China</a>
18:10	Closing Day 2 “ <a href="#">Hasselt Diamond Workshop 2024 – SBDD XXVIII</a> ”.
20:00	Conference dinner at the <i>Ravel &amp; De Boulevard</i> of the <i>Holiday Inn</i> .

## Friday, March 1, 2024

09:30 – 11:00	<b>Session 11</b> <b>Diamond Device Technology II</b> Chair: <a href="#">M. Pilar Villar, Universidad de Cádiz, Spain</a>
11:00 – 11:30	Coffee Break (Grand Banquet Hall)
11:30 – 12:50	<b>Session 12</b> <b>Diamond Devices II</b> Chair: <a href="#">David A.J. Moran, University of Glasgow, U.K.</a>
12:50 – 14:10	Lunch (Grand Banquet Hall)
14:10 – 15:30	<b>Session 13</b> <b>Physics of Colour Centres</b> Chair: <a href="#">Tokuyuki Teraji, National Institute for Materials Science (NIMS), Japan</a>
15:30	Closing “ <a href="#">Hasselt Diamond Workshop 2024 – SBDD XXVIII</a> ”.



Workshop sponsored by [Seki Diamond Systems](#), [Diatope](#), [MUEGGE](#), [Qnami](#), [HiQuTe Diamond](#), [Mintres](#), [Orbray](#), [Diamfab](#), [Konfidi](#), and [Hasselt University](#) via the [Institute for Materials Research \(IMO-IMOMECE\)](#).