YOUNG SCIENTISTS FORUM Invited Presenters Profiles

Dr. **Bruna Costa**, Post-Doctoral Researcher
PhD in Materials Science and Technology (2018)
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Dr. **Paulo Noronha Lisboa-Filho**, Associate Professor
Brazilian Branch of the Institute of Biomaterials,
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Dr. **Bruna Costa** concluded her PhD in 2018 under supervision of Prof. Paulo Noronha Lisboa-Filho. Her research was focused on Biomaterials, specifically biological effects associated to titanium-based wear products (and their physicochemical properties) regarding human bone cells. Special attention was also given to vanadium compounds possibly generated from Ti-6Al-4V biomedical alloys. During her PhD, she spent one-year abroad in three different institutions in Portugal (University of Minho, University of Porto and International Iberian Nanotechnology Laboratory).

Prof. **Paulo Noronha Lisboa-Filho** is the head of Advanced Materials and Nanotechnology Laboratory at São Paulo State University, Bauru, São Paulo, Brazil. Following different research lines, his work is mainly focused on titanium (orthopedics and dental) implants surface modification for improved osseointegration, antibacterial properties and degradation resistance. Strongly devoted to dental applications, he also works with ceramic materials and metalorganic frameworks for specific enzyme immobilization and release.

Recent Publications

Recent Publications:

1. Zens, M. A.; Icochea, L. A.; **Costa, B. C.**; Lisboa-Filho, P. N.; Bastos, N. A.; Furuse, A. Y.; Foschini, C. R.; Garlin-Neto, V.; Franciscone, P. A. S.; Borges, A. F. S. A new approach for Y-TZP surface treatment: evaluations of roughness and bond strength to resin cement. Journal of Applied Oral Science, 2019.
2. Bighetti, A. C. C.; Cestari, T. M.; Santos, P. S.; Arantes, R. V. N.; Paini, S.; Assis, G. F.; **Costa, B.C.**; Oliveira, F. A.; Tokuhara, C. K.; Oliveira, R. C.; Taga, R. In vitro and in vivo assessment of CaP materials for bone regenerative therapy. The role of multinucleated giant cells/osteoclasts in bone regeneration. Journal of Biomedical Materials Research Part B: Applied Biomaterials, 2019.
3. **B. C. Costa**; A. Alves; F. Toptan; A. M. Pinto; L. Grenho; M. H. Fernandes; D. Y. Petrovykh; L. A. Rocha; P. N. Lisboa-Filho. Exposure effects of endotoxin-free titanium-based wear particles to human osteoblasts. Journal of the Mechanical Behavior of Biomedical Materials, 2019.
4. **B. C. Costa**; C. K. Tokuhara ; L. A. Rocha ; R. C. Oliveira ; P. N. Lisboa-Filho ; Costa Pessoa, J. . Vanadium ionic species from degradation of Ti-6Al-4V metallic implants: In vitro cytotoxicity and speciation evaluation. Materials Science & Engineering C-Materials for Biological Applications, v. 96, p. 730-739, 2018.

Exposure effects of endotoxin-free titanium-based wear particles to human bone cells

B. C. Costa[1 *], A. C. Alves[2], F. Toptan[2,3], A. M. Pinto[2,3], L. Grenho[4,5], M. H. Fernandes[4,5], D. Y. Petrovykh[6], L. A. Rocha[7], **P. N. Lisboa-Filho**[7]

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[3] *Department of Mechanical Engineering, University of Minho, 4800-058, Azurém, Portugal*
[4] *Laboratory for Bone Metabolism and Regeneration, Faculty of Dental Medicine, U. Porto – FMDUP, Porto, Portugal;*
[5] *LAQV/REQUIMTE – U. Porto, 4200-393, Porto, Portugal;*
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Corrosion and tribocorrosion behavior of a new beta Ti-15Zr-15Mo alloy designed for medical implants

B. C. Costa[1], C. C. Xavier[1], A. C. Alves[2,3], F. Toptan[2,3], L. A. Rocha[4], P. N. Lisboa-Filho[4]

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[2] *CMEMS-UMinho – Center for Micro Electro Mechanical Systems, University of Minho, 4800-058, Azurém, Portugal;*
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2.

Dr. **Noluthando Mayedwa**, Post-Doctoral Research Fellow
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Dr **Noluthando Mayedwa** earned her PhD in Chemical Science from the University of the Western Cape (UWC) in South Africa 2016. She has a strong background in electrochemistry and nanotechnology. She is currently a Post-Doctoral research fellow at iThemba Laboratories for Accelerator Based Science (iThemba LABS) in South Africa under the UNESCO-UNISA Chair in nanoscience and nanotechnology. She has been on several scientific research visits which include Joint Institute for Nuclear Research (JINR) in Dubna Russia, focused on Photoluminescence spectra in swift heavy ion bombarded insulator. Research visit to the University of Padova in Italy funded by European Research Council (ERC) and National research Fund (NRF), focus area was computational chemistry in molecular modelling, a theoretical chemistry approach to time resolved molecular plasmonics (Tame-Plasmons). Dr Noluthando Mayedwa has published 17 research articles in peer reviewed journal articles, 6 oral presentation in prestigious scientific conferences, 12 poster presentations, supervised 2 students and numerous scientific collaborations in multi-disciplinary areas in science
Publications impact: More than 72 citations, H-index=19, 3672 Readers

Biosynthesis and characterization of multifunctional mixed oxides of $ZnCr_2O_4/ZnCrO_4$ nanoparticulate from natural leaf extracts of Hibiscus *Rosa Sinensis*

N. Mayedwa[a,b], N. Raleie[a], T. Mulaudzi-Masuku[c], N. Matinise[b], M Maaza[a,b]

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Biosynthesis of Metal Oxides nanomaterials from green extracts of Moringa Olefera, Aspalathus Linearis, Sageretia Thea, Maize (Zea Mays L) and Persea Americana Seeds: Electrochemical electrode activity for application in Supercapacitors and Pseudo Capacitive Energy Storage

Noluthando Mayedwa[a,b], Assumpta Chinwe Nwanya [a,b,c], Nolubabalo Matinise[b], Aiman Bashir[b], Malik Maaza [a,b]
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PhD **Tu C. Le**, Postdoctoral Fellow
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Dr. **Tu Le** is a Vice Chancellor's Postdoctoral Fellow at the School of Engineering, RMIT University. Her research focuses on novel computational machine learning approaches to design and develop functional materials. The goal of these projects is to efficiently design fit-for-function materials by mapping the relationship between materials structures or processing conditions and their physicochemical properties. The application of these materials varies from drug delivery, anti-fouling coating, to hydraulic fluid for aircrafts. Dr. Le's research outcomes have been published in high impact journals such as Chemical Reviews, Chemical Society Reviews, Advanced Functional Materials, and Small. Two of her papers have been cited more than 175 times since publication in 2012. Her research impact and contributions have also been recognized through many awards and grants, such as the Jacques-Emile Dubois award, CASS Foundation travel grant, and the joint Japanese Society for the Promotion of Science – Australian Academy of Science grant for attending the HOPE meeting with Nobel Laureates.

Employing artificial intelligence to design intelligent materials

Tu C. Le

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Systematic design of protic ionic liquids using machine learning

Sachini Kadaoluwa Pathirannahalage[1], **Tu C. Le[2]**, Andrew Christofferson[1,2], Tamar Greaves[1]

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PhD. **Donata Iandolo**,
Senior Postdoc
École Mines de Saint-Étienne
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Email: dota.iandolo@gmail.com

Dr. **Donata Iandolo** is Senior postdoc at the Ecole des Mines de Saint-Etienne. She has recently completed a Marie-Sklodowska Curie postdoctoral fellowship at the Department of Chemical Engineering and Biotechnology. She received her master's degree in Industrial Biotechnologies at the University of Naples "Federico II" (Italy) and a PhD thesis in Industrial Biotechnologies. She then joined the Soft Matter Nanotechnology Group at the National Nanotechnology Laboratory (CNR-NANO) (Lecce, Italy) and subsequently worked with Prof. Magnus Berggren at the Laboratory of Organic Electronics. Her research focus is mainly on the integration of electroactive biomimetic 3D scaffolds with human stem cells to develop implantable devices for complete bone defects filling.

Publications impact: More than 205 citations, H-index=21, 2933

The activity in the E-MRS: Dr. Donata Iandolo - the E-MRS Member 2017, 2018 with a special invited Presentation and common presentation with Graduate Student (Young Investigator FORUM 2017) and Keynote Presentation at The Young Scientists Forum (2018) at the E-MRS Symposia "Bioinspired and Biointegrated Materialas as New Frontiers Nanomaterials VII and VIII". Dr. Donata Iandolo is Keynote Presenter at the Symposium IX-th Edition

3D PEDOT-PSS scaffolds for stem cells expansion and osteogenic differentiation.

Donata Iandolo,1,5 Jonathan Sheard,2,3 Galit Katarivas Levy,4 Charalampos Pitsalidis, 5 Ellasia Tan,6 Ji-Seon Kim,6 Athina E. Markaki,4 Darius Widera,2 Roisin M. Owens,5

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Fields of Interest and Expertise: Dr. Martijn Riool is post-doctoral researcher in the group of Dr. S.A.J. Zaat at the Department of Medical Microbiology, Amsterdam UMC (former Academic Medical Center (AMC)) at the University of Amsterdam (UvA). The current research is focused on pathogenesis, prevention and treatment of biomaterial-associated infections, both in soft tissue (catheters, surgical meshes) and bone (implants, fixation devices). Based on a thorough understanding of the events leading to infection, novel strategies are being developed including rapid microbial diagnosis, anti-infective coatings not subject to bacterial resistance development, prevention of biofilm formation, and enhancement of killing of bacteria hiding in tissue surrounding inserted or implanted medical devices. These approaches are aimed at maximally reducing the risk of infection for patients which depend on such medical devices. One of the strategies to prevent and treat biomaterial-associated infections is to use the unique combination of Synthetic Antimicrobial Antibiofilm Peptides (SAAPs) and a controlled release system. Dr. Riool is involved in the organization of training schools on antimicrobial surface testing and young scientist forums intended for early career scientists. Moreover, he is vice-chair of the European network AMiCI "Anti-MIcrobial Coating Innovations to prevent infectious diseases" (COST Action CA15114).

Selected Publications:

1. de Breij A*, Riool M*, Cordfunke RA, *et al.* The antimicrobial peptide SAAP-148 combats drug-resistant bacteria and biofilms. *Sci Transl Med.* 2018;10(423):eaan4044. DOI: 10.1126/scitranslmed.aan4044
2. Riool M*, de Breij A*, de Boer L, *et al.* Controlled Release of LL-37-Derived Synthetic Antimicrobial and Anti-Biofilm Peptides SAAP-145 and SAAP-276 Prevents Experimental Biomaterial-Associated *Staphylococcus aureus* Infection. *Adv Funct Mater.* 2017;27(13):1606623. DOI: 10.1002/adfm.201606623
3. Riool M, de Breij A, Drijfhout JW, Nibbering PH, Zaat SAJ. Antimicrobial Peptides in Biomedical Device Manufacturing. Front Chem. 2017;5(August):1-13. DOI: 10.3389/fchem.2017.00063
4. Riool M, Dirks A, Jaspers V, *et al.* A chlorhexidine-releasing epoxy-based coating on titanium implants prevents *Staphylococcus aureus* experimental biomaterial-associated infection. *Eur Cells Mater.* 2017;33(4):143-157. DOI: 10.22203/eCM.v033a11

Novel Surface Strategies to Combat Biomaterial-Associated Infections

Martijn Riool and Sebastian A.J. Zaat
Amsterdam UMC, location AMC, The Netherlands.

Antimicrobial coating innovations to prevent healthcare-associated infection

Martijn Riool[1], Francy Crijns[2], Column Dunne[3], Isabel Gouveia[4], Nuno Azevedo[5], Anne Kahru[6], Merja Ahonen[7], Martina Modic[8], Kazimierz Murzyn[9], Theofilos Papadopoulos[10], Patrick Cosemans[11], Peter D. Askew[12] and Minna Keinänen-Toivola[7], on behalf of the AMiCI consortium

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6.

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Hiromasa Murata is PhD student of University of Tsukuba supervised by Assoc. Prof. Dr. Kaoru Toko. His research interests are Synthesis of high-quality multilayer graphene (MLG) at low temperature through the metal-induced layer exchange technique. This technique enables us to synthesize MLG on arbitrary substrates. The layer exchanged MLG was the highest crystal quality among the MLG synthesized directly on insulators. Reflecting the excellent crystallinity, the electrical conductivity showed a value comparable to bulk graphite. He has written papers as a first author (five papers) and a corresponding author (one paper). One of the papers has been highlighted in Nature Index [https://www.natureindex.com/article/10.1063/1.5010982]. Moreover, he has won three awards at conferences held in Japan.

Refered Journals Publication List:

1. H. Murata, K. Toko, and T. Suemasu, Multilayer graphene on insulator formed by Co-induced layer exchange, Japanese Journal of Applied Physics 56, 05DE03 (2017).
2. H. Murata, K. Toko, N. Saitoh, N. Yoshizawa, and T. Suemasu, Direct synthesis of multilayer graphene on an insulator by Ni-induced layer exchange growth of amorphous carbon, Applied Physics Letters 110, 033108 (2017).
3. H. Murata, N. Saitoh, N. Yoshizawa, T. Sumasu, and K. Toko, High-quality multilayer graphene on an insulator formed by diffusion controlled Ni-induced layer exchange, Applied Physics Letters 111, 243104 (2017). (Highlighted in Nature INDEX.)
4. Y. Nakajima, H. Murata, N. Saitoh, N. Yoshizawa, T. Sueamsu, and K. Toko, Metal Catalysts for Layer Exchange Growth of Multilayer Graphene, ACS Appl. Mater. Interfaces 10 41664 (2018).
5. H. Murata, Y. Nakajima, N. Saitoh, N. Yoshizawa, T. Suemasu, and K. Toko, High-Electrical-Conductivity Multilayer Graphene Formed by Layer Exchange with Controlled Thickness and Interlayer, Scientific Reports 9, 4068 (2019).

High-quality multilayer graphene formed by thickness-controlled metal-induced layer exchange

and

Layer-exchange synthesis of multilayer graphene for flexible carbon electronics

PhD student **Hiromasa Murata**, Takashi Suemasu, and Kaoru Toko,

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Christopher Jay T. Robidillo from the island nation of the Philippines. He obtained Bachelor's degree in Biochemistry from the University of the Philippines Manila and my Master's degree in Chemistry from the National Tsing Hua University in Taiwan. His previously worked with carbohydrate-encapsulated gold nanoparticles and used them for probing multivalent carbohydrate-protein interactions. Now, Christopher Jay T. Robidillo is part of the very cool Veinot group where my research will primarily involve the fabrication of functional hybrid nanomaterials.
Christopher Jay T. Robidilo - The E-MRS HQ Graduate Student Awarded at The E-MRS Fall Meeting 2018,Warsaw, The Symposium –VIIIth Edition. He is Keynote Presenter at The Symposium –IX th Edition.

Thermally Responsive Photoluminescent Hybrids from Silicon Quantum Dots and Elastin-Like Polypeptides

Christopher Jay T. Robidillo,1,4 Markian S. Bahniuk,2 Sophia Wandelt,3
Gunwant Matharu,1 Larry D. Unsworth,2 Jonathan G.C. Veinot1

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Wongu Youn PhD student studies under supervision of Prof. Insung S. Choi, Korea Advanced Institute of Science and Technology (KAIST - since 03/16). He has obtained his Bachelor Degree in Chemistry in 2016 at KAIST. His research work mainly focuses on the nano-biomaterials and its cell-material interaction.

Youn, W.; Ko, E. H.; Kim M.-H.; Park, M.; Hong, D.; Seisenbaeva, G. A.; Kessler, V. G.; Choi, I. S. Cytoprotective Encapsulation of Individual Jurkat T Cells within Durable TiO_2 Shells for T-Cell Therapy ***Angew. Chem. Int. Ed.*** **2017,** *56*, 10702-10706

Insung S. Choi is Professor of Chemistry and of Bio and Brain Engineering at KAIST, Korea, and the Director of the Center for Cell-Encapsulation Research (Creative Research Initiative; 2012-). He obtained his BS and MS degrees in Chemistry at Seoul National University in 1991 and 1993, and did his PhD degree in Chemistry at Harvard University in 2000 under the supervision of George M. Whitesides. After postdoctoral work with Robert Langer at the Department of Chemical Engineering of MIT, he joined the faculty at KAIST in 2002. He was awarded KCS-Wily Young Chemist Award (2003), Thieme Journal Award (2003), Presidential Young Scientist Award (2004; KAST), and JANG SEHEE Research Achievement Award (2013; KCS). His research interests include biomimetic science and neurochemistry. He has published over 250 peer-reviewed papers. He is the editorial board member of Chemistry-An Asian Journal (Wiley-VCH), ChemNanoMat (Wiley-VCH), Materials Today Bio (Elsevier) and Polymers (MDPI), and the editorial advisory board member of Advanced Healthcare Materials (Wiley-VCH)

Selected publications:

1. Youn, W.; Ko, E. H.; Kim M.-H.; Park, M.; Hong, D.; Seisenbaeva, G. A.; Kessler, V. G.; Choi, I. S. Cytoprotective Encapsulation of Individual Jurkat T Cells within Durable TiO_2 Shells for T-Cell Therapy ***Angew. Chem. Int. Ed.*** **2017,** *56*, 10702-10706
2. Kim, B. J.; Cho, H.; Park, J. H.; Mano, J. F.; Choi, I. S. Strategic Advances in Formation of Cell-in-Shell Structures: from Syntheses to Applications. ***Adv. Mater.*** **2018**, *30*, 1706063.
3. Park, J. H.; Hong, D.; Lee, J.; Choi, I. S. Cell-in-Shell Hybrids: Chemical Nanoencapsulation of Individual Cells. ***Acc. Chem. Res.*** **2016**, *49*, 792-800.

Porous and Durable TiO_2 Encapsulation of Individual Jurkat T Cells for Cytoprotection and Cell Therapy

Wongu Youn, Sang Yeong Han, Seok-Pyo Hong, Insung S. Choi

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Paulina Medina Rangel, studied Biochemical Engineering at the Autonomous University of Aguascalientes, in Mexico where she graduated in 2015. Two years later, she received her Master's degree in Biological Engineering from Compiègne University of Technology (UTC), France. Paulina is currently 3rd-year PhD student at UTC, in the group of Prof. Karsten Haupt and Dr. Bernadette Tse Sum Bui, and her main research interests are molecularly imprinted polymers for biosensing and bioimaging, biomimetic polymers and nanomedicine. She has four publications:

1. **P. Medina-Rangel**, S. Laclef, J. Xu, M. Panagiotopoulou, J. Kovensky, B. Tse Sum Bui, K. Haupt, Solid-phase synthesis of molecularly imprinted polymer nanolabels: Affinity tools for cellular bioimaging of glycans, *Scientific Reports*, 2019, 9, 1-9.
2. B. Demir, M. Lemberger, M. Panagiotopoulou, **P. Medina-Rangel**, S. Timur, T. Hirsch, B. Tse Sum Bui, J. Wegener, K. Haupt, Tracking Hyaluronan: Molecularly Imprinted Polymer Coated Carbon Dots for Cancer Cell Targeting and Imaging, *ACS Appl. Mater. Interfaces*, 2018, 10, 3305-3313.
3. J. Xu, **P. Medina-Rangel**, K. Haupt, B. Tse Sum Bui, Guide to the preparation of molecularly imprinted polymer nanoparticles for protein recognition by solid-phase synthesis, *Methods Enzymol.* 2017, 590, 115-141.
4. M. Panagiotopoulou, S. Kunath, **P. Medina-Rangel**, K. Haupt, B. Tse Sum Bui, Fluorescent Molecularly Imprinted Polymers as Plastic Antibodies for Selective Labeling and Imaging of Hyaluronan and Sialic Acid on Fixed and Living Cells, *Biosens. Bioelectron*. 2017, 88, 85-93.

Dr. Bernadette Tse Sum Bui has an MSc in Chemistry from University of Aix-Marseille and a PhD in Biotechnology from UTC, France. She is a CNRS research engineer, working first on the biosynthesis of biotin in microorganisms, at the University of Paris 6. She joined the CNRS Institute for Enzyme and Cell Engineering at UTC in 2006 to work on molecularly imprinted polymers and their applications in immunoassays, separation, drug delivery and bioimaging. She has supervised several post-docs, 7 PhD and several MSc students.

Pr. Karsten Haupt studied Biochemistry at the University of Leipzig, Germany. In 1994 he obtained his PhD in Bioengineering from Université de Technologie de Compiègne, France. He then spent several years as a research fellow at Lund University, Sweden, where he worked on molecular imprinting with Klaus Mosbach. Back in France he was a researcher at INSERM, Paris, before joining the University of Paris 12 as an associate professor. In 2003 he was appointed full professor of Nanobiotechnology at Université de Technologie de Compiègne (UTC), France, where he is now the Head of the CNRS Institute for Enzyme and Cell Engineering. In 2018 Professor Karsten Haupt has become a senior member of the Institute Universitaire de France. He is one of the founders of the start up company Polyintell (now Affinisep).

Molecularly Imprinted Polymer Nanoparticles for the Detection and Modulation of Cellular Functions

Paulina Medina Rangel, Bernadette Tse Sum Bui, Karsten Haupt

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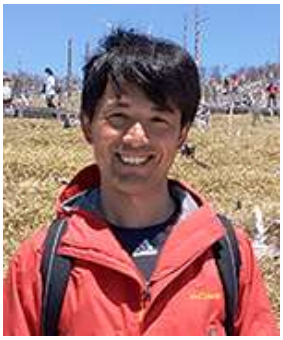

Takeshi Ito received B.D. from Osaka University in Earth and Space Science in 1995, and received M.D. from University of Tokyo in Earth and Planetary Sicence in 1997. Then, he received Dr. Eng. From Keio University in 2007. His scientific interests are boundary face between living substances and inorganic materials including nanostructures, and its application for bio-sensing.

Investigation of cancer biomarker - aptamer attached DNA origami interaction by QCM and its application for biosensor

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Damian Maziukiewicz PhD student studies under supervision of Prof. Stefan Jurga, and co-supervise of Dr. Radosław Mrówczyński. He has obtained his Master Degree in Medical Physics in 2016 at the Faculty of Physics, Poznań. His research work mainly focuses on the nanodiamonds-base multifunctional nanostructures for cancer therapy and imaging.
Maziukiewicz, D.; Grześkowiak, B.F..; Coy, E..; Jurga, S; Mrówczyński, R.; NDs@PDA@ICG Conjugates for Photothermal Therapy of Glioblastoma Multiforme ***Biomimetics*** 2019, 4(1), 3

Stefan Jurga is Professor of Physics and the Director of the NanoBioMedical Centre. He obtained his PhD degree in Physics at Adam Mickiewicz University in 1974, his habilitation in 1985 and the professorship in 1995. He was awarded numerous awards and two orders of state Order of Polonia Restituta (2002) and the Cross of Merit (1989). His research interests include Nuclear Magnetic Resonance Spectroscopy, Small and Wide Angle X-ray Scattering, Electron Microscopy, Optical and Atomic Force Microscopy, FTIR Spectroscopy. He has published over 140 peer-reviewed papers. He was involved in many national and European Grants among which European Soft Matter Infrastructure (ESMI), The International PhD Program in Nanoscience and Nanotechnology and Magnetic Nanoparticles and Thin Films for Spintronic Applications and High Performance Permanent Magnets can be mentioned.

Dr. **Radosław Mrówczyński** holds an adjunct position at NanoBioMedical Center at Adam Mickiewicz University in Poznan. He received his B.Sc. and M.Sci in Chemical Biology at Adam Mickiewicz University Poznan, Poland in 2008 and 2010, respectively. In 2014 he obtained Ph.D. at Humboldt University Berlin under supervision of Professor Jürgen Liebscher. Afterward, he had short-research stay in Korea and Canada. He also is a laureate of Bekker Program from the National Agency of Academic Exchange. In the frame of this project, he worked in the Catalan Institute of Nanoscience and Nanotechnology (ICN2) in Barcelona with Dr. Daniel Ruiz Molina. His research areas are multimodal nanoparticles based on polydopamine and related materials for combined chemo- and photothermal and chemo- and gene therapy aiming at liver and brain cancers. He also studies the chemistry of catechol-based materials both in macro and nanoscale. His awards include START scholarship granted by Foundation for Polish Science and Scholarship for Outstanding Young Scientist granted by the Minister of Higher Education

Selected Publications

1. Maziukiewicz, D.; Grześkowiak, B.F..; Coy, E..; Jurga, S; Mrówczyński, R.; NDs@PDA@ICG Conjugates for Photothermal Therapy of Glioblastoma Multiforme ***Biomimetics*** 2019, 4(1), 3
2. T. Zalewski, P. Lubiatowski, J. Jaroszewski, E. Szcześniak, S. Kuśmia, J. Kruczyński, S. Jurga, Scaffold-aided repair of articular cartilage studied by MRI, ***Magnetic Resonance Materials in Physics, Biology and Medicine*** 2008, 21(3), 177-185.
3. M. Olek, K. Kempa, S. Jurga, M. Giersig, Nanomechanical properties of silica-coated multiwall carbon nanotubes-poly(methyl Dmethacrylate) composite, ***Langmuir*** 2005, 12(7), 3146-3152.
4. A. Jędrzak, B.F Grześkowiak, E. Coy, Ja. Wojnarowicz, K. Szutkowski, S. Jurga, T. Jesionowski, R. Mrówczyński Dendrimer based theranostic nanostructures for combined chemo-and photothermal therapy of liver cancer cells in vitro ***Colloids Surf. B***. 2019, 173,698-708
5. R. Mrówczyński, A. Jędrzak, K. Szutkowski, B.F. Grześkowiak, E. Coy, R. Markiewicz, T. Jesionowski, S. Jurga Cyclodextrin-Based Magnetic Nanoparticles for Cancer Therapy ***Nanomaterials*** 2018,8(3), 170
6. R. Mrówczyński Polydopamine-Based Multifunctional (Nano)materials for Cancer Therapy ***ACS Appl. Mater. Interfaces*** 2018, 10(9),7541-7561

Fluorescent Nanodiamond-decorated Polydopamine Spheres as Theranostic Agents in Cancer Treatment

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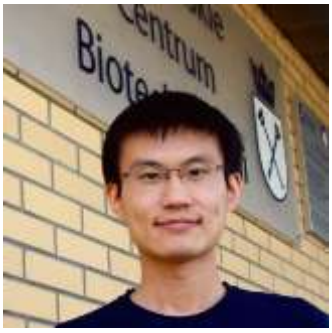

Dr. Yusuke Sakai is one of the youngest awardees of POLONEZ programme, a regional Marie Curie Fellowship co-funded by Polish National Science Centre and Horizon 2020. Since 2016 he has been working as a semi-independent researcher in the group of Prof. Jonathan Heddle at the Malopolska Centre of Biotechnology, Jagiellonian University in Krakow. Before moving from Japan to Poland, he won the JSPS Research Fellowship for Young Scientists and took a doctorate at the Department of Chemistry and Biotechnology, the Graduate School of Engineering, the University of Tokyo in the field of fundamental RNA biochemistry. A part of his PhD research was published via Nucleic Acids Research as Breakthrough Article, and the rest is to be released from Nature Communications soon. At MCB, he shifted his field to DNA nanotechnology and is developing DNA based nanorobot aiming at smart drug delivery (presented here). After the POLONEZ programme, he is drawing a plan to bridge DNA nanotechnology and molecular biology by e.g. offering useful DNA based tools those enable to elucidate challenging issues in basic science.

Selected Publications

1. Sakai, Y., Kimura, S., Suzuki, T. Dual pathways of tRNA hydroxylation ensure efficient translation by expanding decoding capability, *Nature Communications* (in press)
2. Sakai, Y., Islam, M. S., Adamiak, M., Shiu, S.C.-C., Tanner, J. A., Heddle, J. G., DNA Aptamers for the Functionalisation of DNA Origami Nanostructures, Genes 9, 2018 pp. 571
3. Shiu, S.C.-C., Kinghorn, A.B., Sakai, Y., Cheung, Y-W., Heddle, J.G., Tanner, J.A. The Three S's for Aptamer-Mediated Control of DNA Nanostructure Dynamics: Shape, Self-Complementarity, and Spatial Flexibility, ChemBioChem 19, 2018 pp. 1900-1906
4. Kimura, S., Sakai, Y., Ishiguro, K. & Suzuki, T. Biogenesis and iron-dependency of ribosomal RNA hydroxylation. *Nucleic Acids Research* **45**, doi:10.1093/nar/gkx969 (2017).
5. Sakai, Y., Miyauchi, K., Kimura, S., Suzuki, T. Biogenesis and growth phase-dependent alteration of 5-methoxycarbonylmethoxyuridine in tRNA anticodons. Nucleic Acids Research 44, 2016, 509-523

DNA origami nanocapsules for controllable cargo accessibility

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1. Malay, A.D.; Miyazaki, N.; Biela, A.; Chakraborti, S.; Majsterkiewicz, K.; Stupka, I.; Kaplan, C.S.; Kowalczyk, A.; Piette, B.M.A.G.; Hochberg, G.K.A.; Wu, D.; Wrobel, T.P.; Fineberg, A.; Kushwah, M.S.; Kelemen, M.; Vavpetič, P.; Pelicon, P; Kukura, P.; Benesch, J.L.P.; Iwasaki, K.; Heddle, J.G. An ultra-stable gold-coordinated protein cage displaying reversible assembly. *Nature* **2019,** doi:10.1038/s41586-019-1185-4

Jonathan Heddle heads the Bionanoscience and Biochemistry Laboratory. His interests include designing and understanding natural and artificial natural nanomachines using DNA and protein building blocks. In the field of natural nanomachines his interest lies mainly in DNA gyrase[1-4]. His work with DNA has used produced artificial structures using the DNA origami technique including structures with potential for detection/treatment of malaria. In protein nanoscience he has made artificial structures using the ring-shaped protein "TRAP"[5-8]. Most recently this has resulted in a novel artificial cage-shaped protein with interesting geometry and physico-chemical properties[9]. The Heddle lab hopes to understand design and build more of these systems looking towards potential applications in new medicines and materials. www.heddlelab.org

1. Zamble, D.B.; Miller D.A.; Heddle, J.G.; Maxwell, A.; Walsh, C.T.; Hollfelder, F. *Proc. Natl. Acad. Sci. USA* **2001,** 98, 7712-7717.
2. Nagano, S.; Lin, T.; Reddy, J.; Heddle, J. *BMC bioinformatics* **2014,** 15, (1), 416.
3. Shah, S.; Heddle, J.G. *Appl. Microbiol. Biotechnol.* **2014,** 98, (23), 9545-60.
4. Lin, T.-Y.; Nagano, S.; Heddle, J.G. *Sci. Rep.* **2015,** 5, 14491.
5. Miranda, F.F.; Iwasaki, K.; Akashi, S.; Sumitomo, K.; Kobayashi, M.; Yamashita, I.; Tame, J.R.H.; Heddle, J.G. *Small* **2009,** 5, 2077-2084.
6. Malay, A.D.; Heddle, J.G.; Tomita, S.; Iwasaki, K.; Miyazaki, N.; Sumitomo, K.; Yanagi, H.; Yamashita, I.; Uraoka, Y. *Nano Lett.* **2012,** 12, 2056-2059.
7. Imamura, M.; Uchihashi, T.; Ando, T.; Leifert, A.; Simon, U.; Malay, A. D.; Heddle, J. G. *Nano Lett.* **2015,** 15, (2), 1331-5.
8. Nagano, S.; Banwell, E.F.; Iwasaki, K.; Michalak, M.; Pałka, R.; Zhang, K.Y.; Voet, A.R.; Heddle, J.G. *Adv. Mater. Interfaces* **2016,** 3, (24).
9. Malay, A.D.; Miyazaki, N.; Biela, A.; Chakraborti, S.; Majsterkiewicz, K.; Stupka, I.; Kaplan, C.S.; Kowalczyk, A.; Piette, B.M.A.G.; Hochberg, G.K.A.; Wu, D.; Wrobel, T.P.; Fineberg, A.; Kushwah, M.S.; Kelemen, M.; Vavpetič, P.; Pelicon, P; Kukura, P.; Benesch, J.L.P.; Iwasaki, K.; Heddle, J.G. An ultra-stable gold-coordinated protein cage displaying reversible assembly. Nature 2019, doi:10.1038/s41586-019-1185-4

Large and small artificial protein cage – using gold to control size

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Finn N. Zahari received the M.Sc. in Electrical Engineering, Information Technology and Business Management (2017) from the Faculty of Engineering, Kiel University, Germany. During his bachelor thesis and master thesis he worked on neuromorphic networks based on memristive devices for pattern recognition tasks in simulations and in hardware circuits. Afterwards he started the Ph.D. studies at the group for Nanoelectronics at the University of Kiel. His current research interests are the development and investigation of memristive devices using thin film technology and the usage of these devices in neuromorphic circuits within the research unit RU 2093 "Memristive devices for neuronal systems" funded by the Deutsche Forschungsgemeinschaft.
The Chair of Nanoelectronics at Kiel University, Germany, is headed by **Hermann Kohlstedt**. The research subjects of the lab are novel electronic devices for neuromorphic circuits and sensors. Examples include, Josephson junctions, multiferroic tunnel junctions, memristive devices and FET (field effect transistor) based stress sensors. The chair has profound expertise in device fabrication and analytic methods such as Xray diffraction, scanning probe microscopy and soft-X-ray spectroscopy. Since 2014 the chair is leading a DFG funded Research Unit entitled: "Memristive devices for neuronal systems". In particular the experimental realization of time-varying, pulsed-coupled bio-inspired neuronal oscillator networks, comprising signal delay and variable coupling strengths (via memristive devices), are a represent a major research goal.

Refereed Journals Publications List:

1. Zahari, F., Hansen, M., Mussenbrock, T., Ziegler, M., and Kohlstedt, H., Mater. Vol. 2, 203-216 (2015).
2. Hansen, M., Zahari, F., Ziegler, M., and Kohlstedt, H., Front. Neurosci. 11 (2017).
3. Hansen, M., Zahari, F., Kohlstedt, H., and Ziegler, M., Sci. Rep. 8, 8914 (2018).
4. Wenger, C., Zahari, F., Mahadevaiah, M. K., Pérez, E., Beckers, I., Kohlstedt, H., and Ziegler, M., IEEE Electron Device Lett. 40, 639 (2019)

Hardware realization of neuromorphic circuits for pattern recognition based on memristive devices

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Prof. **Christian Wenger** received the Diploma degree in physics from the University of Konstanz in 1995 and the Ph.D. degrees from the Technical University of Dresden in 2000 and 2009. Since 2002, he has been with IHP GmbH, where he is currently involved in the field of functional devices for medical and emerging applications. He has authored or co-authored more than 170 papers and holds eight patents. He received the Microelectronics for Medical Engineering Professorship from the Brandenburg Medical School Theodor Fontane in 2018.

Improved Fabrication Technique in HfO_2-based MIM Modules for RRAM Applications

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Selected Publications:

1. Martín C, Kostarelos K, Prato M, Bianco A*. Biocompatibility and biodegradability of 2D materials: graphene and beyond. *Chem. Commun.*, **2019**, *55*, 5540-5546. DOI: 10.1039/c9cc01205b
2. Fadeel B, Bussy C, Merino S, *et al*. Safety Assessment of Graphene-Based Materials: Focus on Human Health and the Environment. *ACS Nano* **2018**, *12*, 10582−10620. DOI: 10.1021/acsnano.8b04758
3. Kurapati R, Mukherjee S, Martín C, *et al*. Degradation of Single-Layer and Few-Layer Graphene by Neutrophil Myeloperoxidase. *Angew. Chem. Int. Ed*. **2018**, *57*, 11722 –11727. DOI: 10.1002/anie.201806906
4. Merino S, Martín C, Kostarelos K, *et al*. Nanocomposite Hydrogels: 3D Polymer-Nanoparticle Synergies for On-Demand Drug Delivery. *ACS Nano* **2015**, *9*, 4686-4697. DOI: 10.1021/acsnano.5b01433

A Biodegradable Multifunctional Graphene Oxide Platform for Targeted Cancer Therapy

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Viraj Bhingardive is a PhD student in Department of Materials Engineering at Ben-Gurion University of the Negev, Israel. His research interest is mainly focused on lithographically templated assembly of one dimensional nanostructure.

1. V. Bhingardive, L. Menahem, and M. Schvartzman, ″Soft thermal nanoimprint lithography using a nanocomposite mold*”, **Nano Research 2018,*** 11(5), 2705-2714,
2. “Ultra-high resolution soft thermal nanoimprint lithography” – patent applied

Dr. **Mark Schvartzman** is an Assistant Professor in the Department of Materials Engineering and in the Isle Katz Institute for Nanoscale Science & Technology that is part of the Ben-Gurion University of the Negev, Israel. He received his PhD in Columbia University, NY in 2009, and did his postdoc training in Weizmann Institute of Science, Rehovot, Israel, He has over 10 years of research experience on nanoimprint lithography and nanostructured materials. Over the years, he has publications in various prestigious international journals including Science and PNAS and presented his work at various national and international conferences. He is a reviewer for the Journal of Vacuum Science and Technology since 2008 and affiliated with the Israel Vacuum Society since 2009.

Selected publications:

1. G. Le Saux*, N. Bar Hanin*, A. Edri, U. Hadad, A. Porgador, and M. Schvartzman, “Nanoscale Mechanosensing of Natural Killer Cells is Revealed by Antigen-Functionalized Nanowires”, ***Adv. Mater. 2019***, 31,1805954.
2. D. Tsivion, M. Schvartzman, R. Popovitz-Biro, P. von Huth, E. Joselevich, “Guided Growth of Millimeter-Long Horizontal Nanowires with Controlled Orientations” ***Science 2011,*** 333 (6045), 1003.
3. M. Schvartzman, D. Tsivion, D. Mahalu, O. Raslin, and E. Joselevich, “Self-Integration of Nanowires into Circuits by Guided Growth” ***Proc. Nat. Acad. Sci. USA 2013***, 100 (38), 15195.

Site Selective Functionalization of Nanowires for Biological Studies

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Levente Juhasz is currently working as a PhD student in the group of Prof. Dr. Kaori Sugihara at the University of Geneva, Switzerland. He obtained his BSc at the Budapest University of Technology in Chemical Engineering and his MSc at the Eotvos Lorand University Budapest in Materials Science. His research is focused on the mechanochromic properties of polydiacetylenes

Roberto D. Ortuso has just received his PhD in the group of Prof. Dr. Kaori Sugihara at the University of Geneva, Switzerland. He obtained his BSc and MSc at the Polytechnic of Turin, Italy in Biomedical Engineering. His research is focused on the mechanochromic properties of polydiacetylenes.

Kaori Sugihara received her PhD degree under the supervision of Prof. Janos Vörös at ETH Zurich in 2012 with awards including ETH Medal, Chorafas-Prize and Swiss Society of Biomedical Engineering Research Award. She obtained SNSF Fellowships for Prospective Researchers and Humboldt Research Fellowship for Postdoctoral Researchers for her postdoctoral position at Max Planck Institute for Intelligent Systems by Prof. Joachim Spatz. Since 2014, she has started her independent research group at the University of Geneva. Her research interest includes lipid self-assembly, antimicrobial peptides, mechanosensitive polymers, development of tools around electrochemistry and atomic force microscopy towards electronics, material science, and bioengineering.

Atomic force microscopy study of a common polydiacetylene

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PhD student **Anastas A. Romansky** studies under supervision of Prof. Volodymyr L. Karbivskii at G. V. Kurdyumov Institute for Metal Physics of the N.A.S. of Ukraine. He has obtained his Bachelor Degree in Physics in 2017 at National Aviation University, then entered the magistracy at Kyiv Academic University. His main scientific interest is biocompatible hydroxyapatite nanocomposites and the effect of substitutions on the structure and properties of apatites.

Volodymyr L. Karbivskii is director of the SPM&RS-Centre and head of Department of Nanostructures Physics of G. V. Kurdyumov Institute for Metal Physics of the N.A.S. of Ukraine, Doctor of Physics, professor, laureate of State prize in Ukraine in the field of physics and technology (2015). In 1987 he graduated from the Faculty of Physics of the Taras Shevchenko National University of Kyiv. In 1990 he defended his Ph.D. thesis, in 2005 - his doctoral dissertation. In 2004 - 2009, the head of the direction "Bionosystems and bionanomaterials, artificial biomineralization of nanomaterials, application of nanomaterials in biology and medicine" of the program of the N.A.S. of Ukraine "Nanostructural systems, nanomaterials, nanotechnologies". Member of the section "Physics of Nanostructured Systems" of the Interdepartmental Scientific Council on the Problem of Solid State Physics. Scientific interests are concentrated on nanobiotechnologies of structures of biomedical and ecological applications, physics of disordered systems and surface phenomena physics.
Lyubov I. Karbivska is an employee of Department of Nanostructures Physics. In 2005 she graduated from the National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”. She defended her Ph.D. thesis in 2009. Her main scientific interests are nanomaterials X-ray diffraction and nanotechnology.

Theoretical study of the effect of carbonate ions inclusions on the structure and properties of hydroxyapatite

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Dr. **Monica Marini** is a postdoctoral fellow at the Department of Applied Science and Technology (DISAT) of the Polytechnic of Turin and Visiting Scientist at King Abdullah University of Science and Technology (KAUST). Her research focuses on the mechanical and structural study of nucleic acids and their interactions with other biomolecules (e.g., proteins) and ligands (e.g., intercalants, chemotherapeutic compounds), to reveal their connection to diagnosis and disease. To reach this goal, conventional bio -molecular, -chemical and -physical tools are combined with microfabrication, high-resolution TEM imaging, Raman spectroscopy, and Laser Doppler Vibrometer.

Publications impact: More than 91 citations, H-index=23, 3092 Readers

[1] **M. Marini**; A. Falqui; M. Moretti; T. Limongi; M. Allione; A. Genovese; S. Lopatin; L. Tirinato; G. Das; B. Torre; A. Giugni; F. Gentile; P. Candeloro; E. Di Fabrizio, *Sci. Adv.* **2015**, 1, e1500734–e1500734.
[2] **M. Marini***; T. Limongi*; A. Falqui; A. Genovese; M. Allione; M. Moretti; S. Lopatin; L. Tirinato; G. Das; B. Torre; A. Giugni; F. Cesca; F. Benfenati; E. Di Fabrizio, *Nanoscale*. **2017**,.
[3] **M. Marini**; T. Limongi; M. Moretti; L. Tirinato; E. Di Fabrizio, *La Riv. Del Nuovo Cim.* **2017**, 40, 241–277.
[4] **M. Marini**; M. Allione; S. Lopatin; M. Moretti; A. Giugni; B. Torre; E. di Fabrizio, *Microelectron. Eng.* **2018**, 187–188, 39–42.
[5] **M. Marini**; G. Das; R. La Rocca; F. Gentile; T. Limongi; S. Santoriello; A. Scarpellini; E. Di Fabrizio, *Microelectron. Eng.* **2014**, 119, 151–154.
[6] **M. Marini**; M. Allione; B. Torre; M. Moretti; T. Limongi; L. Tirinato; A. Giugni; G. Das; E. di Fabrizio, *Microelectron. Eng.* **2017**, 175, 38–42.
[7] S. Stassi*; **M. Marini***; M. Allione; S. Lopatin; D. Marson; E. Laurini; S. Pricl; C.F. Pirri; C. Ricciardi; E. Di Fabrizio, *Nat. Commun.* **2019**, 10, 1690.

DNA/ligands structural study

M. Marini [1,2], S. Stassi [1], M. Allione [2], B. Torre [2], A. Giugni [2], M. Moretti [2], P. Zhang [2], C.F. Pirri [1], C. Ricciardi 1, E. Di Fabrizio 2

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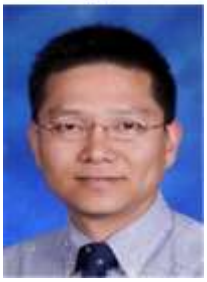

Li Lu PhD student studies under supervision of Prof. Yaopeng Zhang, College of Materials Science and Engineering, Donghua University. She earned her BS degree from Taizhou College in 2011. Her research work mainly focuses in designing biomimetic microfluidic chips, synthesis and the application of high performance artificial animal silk.

Yaopeng Zhang is Professor of College of Materials Science and Engineering, Donghua University. He obtained his Ph.D degree from Donghua University in 2002. After that he finished his postdoctoral study in Kawamura Institute of Chemical Research, Japan, in 2007. He had been a visiting scholar of Akita University, Japan, in 2010 and Stony Brook University, in 2017. Professor Zhang is interested in designing biomimetic microfluidic chips, synthesis and the application of high performance artificial animal silk, 3D printing and other biomimetic materials.

Selected publications

1. Qianqian Niu, Peng, Qingfa; Lu, Li; Fan, Suna; Shao, Huili; Zhang, Huihui; Wu, Rongliang; Hsiao, Benjamin S.; Zhang, Yaopeng, Single molecular layer of silk nanoribbon as potential basic building block of silk materials, **ACS Nano**, 2018,12,11860-11870
2. Ao Zhuang, Yongjun Bian, Jianwei Zhou, Suna Fan, Huili Shao, Xuechao Hu, Bo Zhu, Yaopeng Zhang*, An all organic conductive biomaterial as an electroactive cell interface, ACS Appl. Mater. Interfaces, 2018, 10, 35547-35556 15.
3. Chao Zhang, Yaopeng Zhang, Huili Shao, Xuechao Hu, Hybrid Silk Fibers Dry-Spun from Regenerated Silk Fibroin/Graphene Oxide Aqueous Solutions, ACS Appl. Mater. Interfaces, 2016,8(5):3349-3358.

Strong silk fibers containing cellulose nanofibers generated by a bioinspired microfluidic chip

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Mihui Park received her Bachelor Degree in Chemistry (2015) from Dongguk University-Seoul and joined the Advanced Energy Materials Laboratory since March 2015. Her research interests are on developing active materials for energy storage systems such as alkali-ion and lithium-oxygen batteries under the supervision of Prof. Yong-Mook Kang. Her current research topic is on the investigation of bio-molecules mimicking biological metabolism in battery systems and the realization of bio-inspired mechanism bringing to aprotic battery. Her current research topic is on investigating how bio-molecules relevant to metabolism can be applied to battery systems to replicate the biological mechanism for oxygen transport, especially in lithium-air batteries,

Yong-Mook Kang Prof. Yong-Mook Kang completed his B.Sc. (1999), M.Sc. (2001), and Ph.D. (2004) in Korea Advanced Institute of Science and Technology. He is currently a professor at the Department of Energy and Materials Engineering in Dongguk University-Seoul. His research areas cover electrode and catalytic materials for lithium (Li) rechargeable batteries and Li-oxygen batteries, as well as various post-Li batteries such as Na- and K- rechargeable batteries. For his research achievements in energy conversion & storage materials, he was appointed as a TWAS (Academy of Science for Developing Worlds) Young Affiliate for the first time in South Korea, and awarded the International Collaboration Award of the Australian Research Council in 2010. From 2015, he has been appointed as a RSC (Royal Society of Chemistry) fellow & representative of Korea.

Recent Publications:

1. Song, K.; Jung, J.; Park, M.; Park, H.; Kim, H.-J.; Choi, S.-I.; Yang, J.; Kang, K.; Han, Y.-K.; Kang, Y.-M. Anisotropic surface modulation of Pt catalysts for highly reversible Li-O_2 batteries: High index facet as a critical descriptor *ACS Catal.* 2018, 8, 9006.
2. Zhang, K.; Kim, D.; Hu, Z.; Park, M.; Noh, G.; Yang, Y.; Zhang, J.; Lau, V. W.-H.; Chou, S.-L.; Cho, M.; Choi, S.-Y.; Kang, Y.-M. Manganese based layered oxides with modulated electronic and thermodynamic properties for sodium ion batteries *Nat. Commun.* 2019, 10, 5203.
3. Kim, D.; Zhang, K.; Cho, M.; Kang, Y.-M. Critical design factors for kinetically favorable P-based compounds toward alloying with Na ions for high-power sodium-ion batteries *Energy Environ. Sci.* 2019, 12, 1326.

Metabolism-mimicking lithium-oxygen batteries with natural oxygen carriers

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Volodymyr Buchakchiyskyi is a bachelor's degree student in the field of computer engineering of the Yuriy Fedkovych Chernivtsi National University. Has experience in automating experimental research of bioobjects, development of information-measuring tools and systems with remote control, including using Internet technologies for mobile systems and gadgets, mathematical and computer data processing.

Dr. **Heorhii Vorobets** graduated from Chernivtsi State University in 1985. He continued postgraduate course and defended his Ph.D. thesis at the Taras Shevchenko Kyiv State University in 1989. In 2016 at the Department of Computer Systems and Networks of the Chernivtsi National University named after Yuri Fedkovich a laboratory on advanced technologies of Internet of things and cyber-physics systems was organized. Complex researches are conducted and the concepts of analysis and synthesis of optimized self-reconfigurable embedded and distributed computer tools of cyber-physics and bio-cybernetic systems are proposed on the basis of bioinspiring approach and "smart" analysis of data and functional algorithms of systems. The laboratory conducts a full cycle of research of "smart" systems: from the synthesis of semiconductor sensors of physical quantities and environmental parameters, measurement of their electrical parameters and laser correction, to the development of microprocessor systems for information processing and control. Spectral properties of nanostructured semiconductor materials and organic compounds are also investigation in the laboratory.

Selected Publications:

1. Heorhii Vorobets, Volodumur Strebezhev, Viktor Strebezhev, Ruslan Hurjui, Roman Rogov. Application of the infrared semiconductors interference filters for optical sensors in express spectroscopy of organic materials. // Journal of Faculty of Food Engineering, Ştefan cel Mare University of Suceava, Romania Volume XIV, Issue 1 - 2015, pp. 93 – 100.
2. Vorobets G.I., Gurzhui R.D., Kuz M.A. Computerized system with reconfigurable architecture for monitoring environmental parameters. // East European Journal of Advanced Technologies. - 2015-№2, P. 55-59.

Application of Internet technologies for monitoring the bio-objects and bio-cybernetic systems

Heorhii Vorobets, **Volodymyr Buchakchiyskyi**, Olexiy Pshenychnyi, Olha Vorobets

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Application of mathematical modeling to study the fine structure of spectra of protein complexes

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Dr. **Iryna Kondrachuk** graduated Master of Science course at Yu. Fedkovych Chernivtsi National University in 2004, and defended his Ph.D. thesis in 2010. Scientific interests are next: semiconductor photocatalysis; photochemistry of the dyes sensitizers; research of photosensitive materials based on TiO_2; assessment food quality and food safety control.
Head of the department, doctor of chemical sciences, professor **Igor Kobasa** graduated from Chernivtsi State University in 1979. He defended his Ph.D. thesis in 1989. Defended his doctoral dissertation in 2006. Scientific interests are next: photo-sensitive and antibacterial composite materials based on titanium dioxide, natural aluminosilicates and synthetic phosphates; research and creation of new antibacterial packaging materials for long-term storage of food products; improvement of scientific criteria of universalization of methods of atomic absorption determination of heavy metals in objects of the environment, agricultural products and food products; development of scientific principles and practical recommendations for the application of nanotechnologies in the production of health food products.

Photocatalytic and Antibacterial Activity of Nanodispersed TiO_2 Obtained by the Pyrogenic Method (part I)

and

Photocatalytic and Antibacterial Activity of Nanodispersed TiO_2 Obtained by the Pyrogenic Method (part II experiment)

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Sachini Kadaoluwa Pathirannahalage is a PhD student at RMIT University, investigating protic ionic liquid properties using machine learning. Her project involves creating machine learning models using experimental data to systematically tailor ionic liquids for applications such as biomolecule preservation. She completed her BSc (Dean's scholar, honours) at RMIT University and her honours project was in the area of polymer characterization.

Dr. Tu Le is a Vice Chancellor's Postdoctoral Fellow at the School of Engineering, RMIT University. Her research focuses on novel computational machine learning approaches to design and develop functional materials. The goal of these projects is to efficiently design fit-for-function materials by mapping the relationship between materials structures or processing conditions and their physicochemical properties. The application of these materials varies from drug delivery, anti-fouling coating, to hydraulic fluid for aircrafts. Dr. Le's research outcomes have been published in high impact journals such as Chemical Reviews, Chemical Society Reviews, Advanced Functional Materials, and Small. Two of her papers have been cited more than 175 times since publication in 2012. Her research impact and contributions have also been recognized through many awards and grants, such as the Jacques-Emile Dubois award, CASS Foundation travel grant, and the joint Japanese Society for the Promotion of Science – Australian Academy of Science grant for attending the HOPE meeting with Nobel Laureates.

Systematic design of protic ionic liquids using machine learning

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Ainur Zhussupbekova was awarded a Bolashak International Scholarship to begin PhD in Physics and joined the Applied Physics Research group in Trinity College as a postgraduate student in April 2017. She completed the bachelor degree (First Class Honours) in Technical Physics from Eurasian National University (Kazakhstan) and master degree in the same university in 2014. During master thesis worked on the study of mechanisms of track formation in SiO_2/Si and Si_3N_4/Si irradiated by swift heavy ions.
Fast and low cost oxides growth technique Spray pyrolysis and materials characterisation techniques such as X-ray Photoelectron Spectroscopy and X-ray diffraction comprise a large part of her research that is focused on the growth of interface formation of n-type Transparent Conducting Oxides (TCOs) such as Zinc Tin Oxide and p-type TCOs such as Cu_xCrO_2.
Dr. Karsten Fleischer is an Associate Professor on Surface and Interface Science and Characterisation of Advanced Materials/Nanomaterials in the School of Physical Sciences in Dublin City University since 2018. He received his PhD at the TU Berlin in 2005. He was an IRCSET Postdoctoral Fellow at Trinity College Dublin till 2007 and continued to work as Postdoctoral Fellow in TCDs Applied Physics Research Group. Dr. Fleischer's research focuses on thin film oxides and oxide surface modifications for energy and ICT applications. This includes their thorough characterisation in terms of stoichiometry, optical-, electrical-, and crystallographic properties using various deposition and characterisation techniques. His research also includes the investigations of the surface states in such oxides by electrical and surface sensitive optical characterisation methods.

Selected Publications:

[1] E. Norton, L. Farrell, A. Zhussupbekova, D. Mullarkey, D. Caffrey, D. T. Papanastasiou, D. Oser, D. Bellet, I.V. Shvets, and K. Fleischer. "Bending stability of $Cu_{0.4}CrO_2$—A transparent p-type conducting oxide for large area flexible electronics". *AIP Adv.*, **8**, 085013, (2018)
[2] K. Fleischer, E. Norton, D. Mullarkey, D. Caffrey, and I. V. Shvets. "Quantifying the Performance of P-Type Transparent Conducting Oxides by Experimental Methods". *Materials*, **10**(9), 1019, (2017)
[3] D. Caffrey, E. Norton, C. Ó'Coileáin, C. M. Smith, B. Bulfin, L. Farrell, I. V. Shvets, and K. Fleischer. "Decoupling the refractive index from the electrical properties of transparent conducting oxides via periodic superlattices". *Sci. Rep.*, **6**, 33006, (2016)

A detailed compositional study of amorphous $ZnSnO_y$ for novel device manufacturing

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Changda Wang receive his Bachelor Degree in Materials Science in 2014 from University of Science and Technology of China (USTC). He has started the Master and Ph.D. studies at National Synchrotron Radiation Laboratory, USTC, under supervision of Prof. Li Song since 2014. His research work mainly focuses on the development and investigation of multi-functional nanomaterials and their applications in energy, flexible and wearable electronics.

1. Changda Wang, Li Song, and et al. All-Carbon Ultrafast Supercapacitor by Integrating Multidimensional Nanocarbons. Small 2016, 12, 5684-5691.
2. Changda Wang, Li Song, and et al. Membrane-assisted assembly strategy of flexible electrodes for multifunctional supercapacitors. Carbon 2017, 125, 419-428.
3. Changda Wang, Li Song, and et al. Atomic Cobalt Covalently Engineered Interlayers for Superior Lithium-Ion Storage. Adv. Mater. 2018, 1802525.
4. Changda Wang, Li Song, and et al. Atomic Sn4+ Decorated into Vanadium Carbide MXene Interlayers for Superior Lithium Storage. Adv. Energy Mater. 2018, 1802977.

Li Song is is currently a Professor in National Synchrotron Radiation Lab at University of Science and Technology of China (USTC). He received his Ph.D. in 2006 from Institute of Physics, Chinese Academy of Sciences. After four years as Humboldt fellow at University of Munich in Germany and postdoctoral researcher at Rice University in USA, he became an associate professor at Shinshu University in Japan. He was promoted to professor at University of Science and Technology of China in 2012 by CAS Hundred Talent Program and Recruitment Program of Global Experts. His current research interests are synchrotron radiation study of low dimensional nanostructures and nanomaterials, as well as their applications in energy, biomedicine and related fields. He has authored and co-authored more than 200 SCI papers with over 10000 citations, H-index of 52. More details can be found from his research ID http://www.researcherid.com/rid/B-1950-2010

Engineering multi-dimensional nanocarbon and hybrids towards various applications

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Publication

1. T. Nishida, K. Moto, N. Saitoh, N. Yoshizawa, T. Sumasu, and K. Toko, High photoresponsivity in a GaAs film synthesized on glass using a pseudo-single-crystal Ge seed layer, Applied Physics Letters 114, 142103 (2019).

Low-temperature synthesis of GaAs films on insulators for wearable solar cells

and

Al-induced layer exchange of Ge for seed layer applications

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Dr. **Peng Zhang** is a Postdoctoral Fellow at the Physical Science and Engineering (PSE) Division of King Abdullah University of Science and Technology (KAUST). His research fields are from design and fabricate bio-inspired structures in micro/nano scale to their applications in molecular structural characterizations, such as Raman spectroscopy, X-ray diffraction, and electron microscopy. In addition, Dr. Zhang has more than five years' experience in nan-bio fused research area such as microfluidics and single-molecule/particle detection and imaging in living cell. Many his research were published in high quality Journals, such as *Chemical Communications*, *Talanta*, *Scientific Reports*, *Analytical Chemistry*, *Biosensors and Bioelectronics*, and *Chemical Reviews*.

Prof. **Enzo Di Fabrizio** conducts interdisciplinary research between physics and biology and nanomedicine that includes basic and applied research in nanotechnology. At KAUST, he is dedicated to setting up a new lab for molecular sensing and imaging. His main interests concern the study of material and macromolecules at nanoscale and their structure and function through novel spectroscopy approaches mediated by nanostructures. His research interests also include nanofabrication of plasmonic devices, optical tweezers-based microscopy (applied to biophysics and nanomedicine), and Raman spectroscopy for single-molecule detection through scanning probe, design and fabrication of microfluidics nanodevices dedicated to cellomics and drug delivery, proteomic, biophotonic and TEM imaging.

Selected Publications

1. Peng Du, **Peng Zhang** Jea-su Yu, and Seong Ho Kang "Hydrothermal synthesis and application of Ho^{3+}-activated $NaYbF_4$ bifunctional upconverting nanoparticles for in vitro cell imaging and latent fingerprint detection" **Co-first Author**, ***Sensors and Actuators B: Chemical*** 252 (2017), 584.
2. Tao Chen, Bin Dong, Kuangcai Chen, Fei Zhao, Seungah Lee, **Peng Zhang**, Seong Ho Kang, Ji Won Ha, Weilin Xu, and Ning Fang. "Optical Super-Resolution Imaging of Surface Reactions" ***Chem. Rev.*** 117 (2017), 7510.
3. Maria Laura Coluccio, Gerardo Perozziello, Natalia Malara, Elvira Parrotta, **Peng Zhang**, Francesco Gentile, Tania Limongi, Pushparani Michael Raj, Gianni Cuda, Patrizio Candeloro, Enzo Di Fabrizio. "Microfluidic platforms for cell cultures and investigations", ***Microelectronic Engineering*** 208 (2019), 14.

Micro-Pillars based Bio-Inspired Super-Hydrophobic Surface for Protein Amyloid Fibrils Analysis

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Selected publications

1. S. A. Adonin, L.A. Frolova, M. N. Sokolov, G. V. Shilov, D. V. Korchagin, V. P. Fedin, S. M. Aldoshin, K. J. Stevenson, P. A. Troshin, Antimony (V) complex halides: lead-free perovskite-like materials for hybrid solar cells. ***Adv. Energy Mater.*** **2018**, 8, 1701140
2. Hsieh, F.-Y.; Zhilenkov, A. V.; Voronov, I. I.; Khakina, E. A.; Mischenko, D. V.; Troshin, P. A.; Hsu, S.-h. Water-soluble fullerene derivatives as brain drugs: surface chemistry determines neuroprotective and antitumor effects. ***ACS Appl. Mater. Interfaces*** **2017**, *9*, 11482–11492
3. A. F. Akbulatov, S. Luchkin, L. A. Frolova, N. N. Dremova, K. J. Stevenson, P. A. Troshin. Probing the intrinsic thermal and photochemical stability of the hybrid and inorganic lead halide based perovskites. ***J. Phys. Chem. Lett.*** **2017**, *8*, 1211–1218

Exploring water-soluble fullerene derivatives as potential antiviral pharmaceuticals

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Sofiya Matviykiv is a Ph.D. student at the University of Basel in the team of Bert Müller (Biomaterials Science Center). Sofiya is completing her Ph.D. degree in Nanosciences, supported by the Swiss Government Excellence Scholarship, awarded on a competitive basis. Her work is focused on the characterization of mechano-responsive liposomes for targeted drug delivery. The methods, she applied with the aim to treat cardiovascular diseases, include dynamic light scattering, small-angle neutron scattering, enzyme-linked immunosorbent assays, and atomic force microscopy. Much attention has been given to Sofiya's presentations at scientific conferences. She was awarded with the Best Oral Presentation at the 28th Annual Conference of the European Society for Biomaterials (Athens, Greece) and won the H. Don Wolpert Award within the Bioinspiration, Biomimetics, and Bioreplication VII section at the SPIE 2017 - Smart Structures NDE (Portland, USA). This award is sponsored by the Optical Society of Southern California. In parallel with a Ph.D. studies, Sofiya participates in the Next Generation Scientist internship program at Novartis Pharma AG focused on clinical trial management.

Dr. **Marzia Buscema** got her M.Sc. in Physics at the University of Catania (Italy). In 2018 Marzia graduated with a Ph.D. degree in Nanosciences from the University of Basel. She worked in the group of Prof. Dr. Bert Müller. Marzia's research project was focused on the optimization of shear-sensitive phospholipid liposomes as nano-containers for local drug release in diseased human coronary arteries. Her research included the study of liposome stability (dynamic light scattering), the liposome biocompatibility with the immune system by in vitro and in vivo experiments, the fabrication of microfluidic devices used as window to spatially resolve morphological changes of liposomes undergoing to shear stress (microfluidics combined with X-ray scattering-based technique) and the investigation of the morphology of normal and blocked human coronary arteries (X-ray tomography-based technique). Currently, Dr. Buscema is employed by the CNR-IMM in Catania. She is working on the nanofabrication of electronic components using electron beam lithography within the 'BeforeHand' project granted by the European Union's Horizon 2020 research and innovation program (grant agreement No 824957).

Prof. Dr. **Bert Müller** has been Thomas Straumann-Chair for Materials Science in Medicine at the University of Basel, Switzerland, since September 2006. In 1994, he obtained a Ph.D. in experimental physics from the University of Hannover, Germany. For his achievements, he was granted with the Morton M. Traum Award of the American Vacuum Society. Since April 2001, he has been teaching as faculty member of the Physics Department at ETH Zurich. The Biomaterials Science Center, founded by Müller in March 2007, hosts researchers from many fields dealing with nanotechnology-based artificial muscles for incontinence treatment, compliant electrodes for brain stimulation, mechano-responsive nano-containers for targeted drug delivery for the treatment of cardiovascular diseases, highresolution X-ray imaging to visualize the human body down to the molecular level in health and disease, and further applications of nanosciences in medicine and dentistry. The mission of the research team can be summarized by employing physical principles for human health. Professor Müller is author of more than 300 publications in a wide variety of journals, many of them have been the result of doctoral thesis he supervised in the fields of medicine, *dentistry, physics, nanosciences, and biomedical engineering*. In 2014, he was elected as Fellow of SPIE and in 2015 as an active member of the European Academy of Sciences and Arts.

Recent publications:

1. **S. Matviykiv**, H. Deyhle, J. Kohlbrecher, F. Neuhaus, A. Zumbuehl, B. Müller, Small-angle neutron scattering study of temperature-induced structural changes in liposomes, Langmuir (2019), in press.
2. **M. Buscema**, H. Deyhle, T. Pfohl, A. Zumbuehl, B. Müller, Spatially resolved small-angle X-ray scattering for characterizing mechanoresponsive liposomes using microfluidics, Materials Today Bio 1 (2019) 100003.
3. **S. Matviykiv**, **M. Buscema**, G. Gerganova, T. Mészáros, G.T. Kozma, U. Mettal, F. Neuhaus, T. Ishikawa, J. Szebeni, A. Zumbuehl, B. Müller, Immunocompatibility of Rad-PC-Rad liposomes in vitro, based on human complement activation and cytokine release, Precision Nanomed 1 (2018) 45.

Employing physical stimuli present at atherosclerotic blood vessels to structurallymodify liposomal nano-containers

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Pavel Troshin is an Associate Professor in Skoltech, the head of the Laboratory of Functional Materials for Electronics and Medicine at the Institute for Problems of Chemical Physics of Russian Academy of Sciences (IPCP RAS). He also serves as Chair of the Research Center of Nanostructured Materials for Energy Conversion and Storage co-founded by Skoltech and IPCP RAS. Dr. Troshin graduated with a specialist degree in Organic and Physical Chemistry from Higher Chemical College of RAS at D. I. Mendeleev University of Chemical Technology. In 2006, he obtained his PhD degree in Physical Chemistry from the Institute for Problems of Chemical Physics of Russian Academy of Sciences. Over the last 10 years, he coordinated and led more than 30 different research projects, for which he raised state & industry grants, including grants from the Russian Science Foundation, Russian Foundation for Basic Research, Russian Ministry of Science and Education, grants of European Science Foundation and contracts with Russian and foreign companies and research centers. He has published over 200 peer-reviewed papers and presented >30 invited and plenary talks at high-profile international conferences.

Water-soluble amino acid fullerene derivatives as promising antiviral drugs

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