Dr. Željko Janićijević

Date of birth: 20.07.1988.
Nationality: Serbian
[redacted]
ORCID: 0000-0002-9494-9529

EMPLOYMENT

Apr. 2021–present **Postdoctoral Researcher**
Institute of Radiopharmaceutical Cancer Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

- Design and development of various electrochemical biosensing platforms
- Design and development of hydrogels and polymeric biomaterials
- Daily supervision and training of doctoral and master's students
- Assistance in the preparation of funding applications

QUALIFICATIONS

2015–2020 **Ph.D., Electrical Engineering and Computing**
School of Electrical Engineering, University of Belgrade, Belgrade, Serbia
Module: Nuclear, Medical, and Ecological Engineering
Dissertation title: *Composite reservoirs with crosslinked poly(acrylic acid) hydrogel for controlled drug delivery via nonspecific electrical interactions*

- Engineered electronic devices for iontophoresis experiments and electrical characterization of polymeric membranes
- Organized experiments in external institutions (Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Faculty of Technology and Metallurgy, Institute for Biological Research "Siniša Stanković", and Vinča Institute of Nuclear Sciences)
- Took the initiative to join the multidisciplinary team on an international project "Automated Functional Screening of IgGs for Diagnostics of Neurodegenerative Diseases"

2011–2013 **M.Sc., Biomedical Engineering**
The University of Luebeck and the Luebeck University of Applied Sciences, Luebeck, Germany
Specialization: Electronics; Average grade: 1.1/1.0
Thesis title: *Impedance Flow Cytometer for On-Chip Detection and Counting of Bacteria*

- Researched techniques for microscale and nanoscale fabrication

- Designed and constructed multiple electrical and optical setups for experimental testing of devices for medical diagnostics
- Developed computer programs for advanced signal processing and analysis

2007–2011 **B.Sc., Electrical Engineering and Computing**
School of Electrical Engineering, University of Belgrade, Belgrade, Serbia
Module: Physical Electronics; Average grade: 9.2/10
Specialization: Biomedical and Ecological Engineering
Thesis title: *Investigation of protein adsorption on hydroxyapatite nanoparticle ceramics*

- Actively mentored high school students and trained them for research in chemistry

RESEARCH EXPERIENCE

Apr. 2021–present **Postdoctoral Researcher,** Institute of Radiopharmaceutical Cancer Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany
Department: Nano-Microsystems for Life Sciences
Department Head: Dr. Larysa Baraban

- Designed and developed electrochemical biosensors with related electronic interfacing systems for sensor conditioning, calibration, and readout (hardware and software)
- Designed and fabricated polymeric materials for applications in biodegradable electronics and microbioreactors for cancer cell culture
- Assisted in grant proposal writing and mentored group members (M.Sc. and Ph.D. students)

2019 Jul.–Sep. **MSCA RISE fellow**, Elvesys-Microfluidics Innovation Center, Paris, France
Project: Automated Functional Screening of IgGs for Diagnostics of Neurodegenerative Diseases (AUTOIGG)

- Designed and constructed a prototype of the resealable microfluidic system for cell culture
- Received training in microfluidic fabrication and flow control techniques
- Devised and implemented a vesicle segmentation algorithm for fluorescence micrographs

2019–2021 **External Research Assistant**, Faculty of Biology, University of Belgrade, Belgrade, Serbia
Project: Automated Functional Screening of IgGs for Diagnostics of Neurodegenerative Diseases (AUTOIGG)
Principal Investigator: Prof. Pavle R. Andjus

- Developed the optofluidic pilot-scale platform compatible with fluorescence microscopy
- Engineered the system for electronic control and detection of fluid flow
- Worked in a multidisciplinary international team (engineers, biologists, and physicians) with more than 30 members on the project involving 9 institutions

2016–2021 **External Graduate Researcher**, Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, Serbia
Advisors: Dr. Filip Radovanović and Dr. Magdalena Stevanović

- Designed, synthesized, and characterized composite hydrogels for controlled passive and iontophoretic drug delivery; authored 3 journal articles on this topic

- Devised and developed an innovative method for the synthesis of zinc oxide nanoparticles
- Investigated photopolymerization, phase inversion, effects of electric fields on polyelectrolytes, and modifications of chemical precipitation techniques

2014–2016 **Research Project**, Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, Serbia
Advisor: Dr. Miodrag Lukić

- Devised and developed an innovative synthesis of hydroxyapatite bioceramics based on AC electric field-assisted wet precipitation; authored one journal article on the topic
- Devised and implemented the algorithm for the processing of recorded SEM images involving noise reduction, feature extraction, and enhancement of image quality

2014–2021 **Graduate Researcher**, School of Electrical Engineering, University of Belgrade, Belgrade, Serbia
Advisors: Prof. Dejan Raković and Asst. Prof. Miloš Vujisić

- Designed and constructed adjustable research-grade voltage and current sources
- Engineered experimental setups for the measurement of ionic conductivity and impedance spectroscopy of conductive polymeric membranes

2013 Jan.–Nov. **Master Thesis Project**, Chair of Materials Science and Nanotechnology, Faculty of Mechanical Science and Engineering, TU Dresden, Dresden, Germany
Advisor: Dr. Larysa Baraban

- Designed, constructed, and evaluated different microfluidic chips for impedance flow cytometry of particles and bacterial cells
- Engineered electrical and optical setups to assess the motion of particles and cells in microfluidic devices
- Modeled the motion of particles and cells in microchannels using multiphysics software and created dedicated MATLAB scripts for video analysis and particle tracing in fluid flow

PUBLICATIONS

PEER-REVIEWED JOURNAL ARTICLES

Janićijević, Ž.*, Nguyen-Le, T.-A.*, Alsadig, A., Cela, I., Žilėnaite, R., Tonmoy, T. H., Kubeil, M., Bachmann, M., & Baraban, L. (2023). Multiplexed extended gate field-effect transistor biosensor with gold nanoantennae as signal amplifiers. *Biosensors and Bioelectronics*, *241*, 115701. https://doi.org/10.1016/j.bios.2023.115701 *first authors with equal contributions

Peng, X., **Janićijević, Ž.**, Lemm, S., Laube, M., Pietzsch, J., Bachmann, M., & Baraban, L. (2023). Shell engineering in soft alginate-based capsules for culturing liver spheroids. *Biotechnology Journal*, *18*(6), 2200365. https://doi.org/10.1002/biot.202200365

Sandoval Bojórquez, D. I.*, **Janićijević, Ž.***, Palestina Romero, B., Oliveros Mata, E. S., Laube, M., Feldmann, A., Kegler, A., Drewitz, L., Fowley, C., Pietzsch, J., Fassbender, J., Tonn, T., Bachmann, M., & Baraban, L. (2023). Impedimetric Nanobiosensor for the Detection of SARS-CoV-2

Antigens and Antibodies. *ACS Sensors*, *8*(2), 576–586. https://doi.org/10.1021/acssensors.2c01686 *first authors with equal contributions

Bockholt, R., Paschke, S., Heubner, L., Ibarlucea, B., Laupp, A., **Janićijević, Ž.**, Klinghammer, S., Balakin, S., Maitz, M. F., Werner, C., Cuniberti, G., Baraban, L., & Spieth, P. M. (2022). Real-Time Monitoring of Blood Parameters in the Intensive Care Unit: State-of-the-Art and Perspectives. *Journal of Clinical Medicine*, *11*(9), Article 9. https://doi.org/10.3390/jcm11092408

Janićijević, Ž.*, Stanković, A., Žegura, B., Veljović, Đ., Djekić, L., Krajišnik, D., Filipič, M., & Stevanović, M. M. (2021). Safe-by-design gelatin-modified zinc oxide nanoparticles. *Journal of Nanoparticle Research*, *23*(9), 203. https://doi.org/10.1007/s11051-021-05312-3 *corresponding author

Janićijević, Ž., Vujčić, I., Veljović, Đ., Vujisić, M., & Radovanović, F. (2020). Composite poly(DL-lactide-co-glycolide)/poly(acrylic acid) hydrogels synthesized using UV and gamma irradiation: Comparison of material properties. *Radiation Physics and Chemistry*, *166*, 108466. https://doi.org/10.1016/j.radphyschem.2019.108466

Janićijević, Ž., Ninkov, M., Kataranovski, M., & Radovanović, F. (2019). Poly(DL-Lactide-*co*-ε-Caprolactone)/Poly(Acrylic Acid) Composite Implant for Controlled Delivery of Cationic Drugs. *Macromolecular Bioscience*, *19*(2), 1800322. https://doi.org/10.1002/mabi.201800322

Janićijević, Ž., & Radovanović, F. (2018). Polyethersulfone/poly(acrylic acid) composite hydrogel membrane reservoirs for controlled delivery of cationic drug formulations. *Polymer*, *147*, 56–66. https://doi.org/10.1016/j.polymer.2018.05.065

Janićijević, Ž.*, Lukić, M. J., & Veselinović, L. (2016). Alternating current electric field modified synthesis of hydroxyapatite bioceramics. *Materials & Design*, *109*, 511–519. https://doi.org/10.1016/j.matdes.2016.07.061 *corresponding author

Book chapters

Stevanović, M., Lukić, M. J., Stanković, A., Filipović, N., Kuzmanović, M., & **Janićijević, Ž.** (2019). Chapter 1 - Biomedical inorganic nanoparticles: Preparation, properties, and perspectives. In V. Grumezescu & A. M. Grumezescu (Eds.), *Materials for Biomedical Engineering* (pp. 1–46). Elsevier. https://doi.org/10.1016/B978-0-08-102814-8.00001-9

Conference papers

Jović, A., **Janićijević, Ž.**, Jankovic, M. M., Janković, N. Z., Barjaktarović, M., Čantrak, Đ. S., & Gadjanski, I. (2017). Simulating fluid flow in "Shrinky Dink" microfluidic chips—Potential for combination with low-cost DIY microPIV. *2017 IEEE East-West Design & Test Symposium (EWDTS)*, 1–5. https://doi.org/10.1109/EWDTS.2017.8110052

Simeunović, J. P., Gadjanski, I., **Janićijević, Ž.**, Janković, M. M., Barjaktarović, M. M., Janković, N. Z., & Čantrak, Đ. S. (2017). Microfluidic Chip Fabrication for Application in Low-Cost DIY MicroPIV. In V. Majstorovic & Z. Jakovljevic (Eds.), *Proceedings of 5th International Conference on Advanced Manufacturing Engineering and Technologies* (pp. 451–459). Springer International Publishing. https://doi.org/10.1007/978-3-319-56430-2_34

Atanasijević, P., & **Janićijević, Ž.** (2017). Programmable pulse current source for in vitro investigations of iontophoresis. *Proceedings of Papers – 61st Conference on Electronics, Telecommunications, Computing, Automatics and Nuclear Engineering, ETRAN 2017, Kladovo, Serbia, June 05 – 08, 2017*, BT1.2.1-5. https://www.etran.rs/2017/ETRAN/Zbornik_radova/. *In Serbian.*

Janićijević, Ž. (2017). Simple programmable current source for controlled delivery via iontophoresis. *Proceedings of Papers – 61st Conference on Electronics, Telecommunications, Computing, Automatics and Nuclear Engineering, ETRAN 2017, Kladovo, Serbia, June 05 – 08, 2017*, BT1.1.1-5. https://www.etran.rs/2017/ETRAN/Zbornik_radova/. *In Serbian.*

Janićijević, Ž., Weber, B., & Nestler, B. (2013). Acquisition of index fingertip time-resolved optical transmission spectra. *Proceedings Student Conference on Medical Engineering Science, Luebeck, Germany, March 13 – 14, 2013*, 167–170.

CONFERENCE PRESENTATIONS

"Augmentation of the Standalone Multiplexed Extended-Gate Field-Effect Transistor Immunosensor Response with Gold Nanoparticle/Antibody Bioconjugates." Oral presentation at the 2nd International Conference on Nanotechnologies and BioNanoScience (NanoBio 2023), Heraklion, Greece, September 2023.

"Multiplexed Extended-Gate Field-Effect Transistor-Based Immunosensor with Gold Nanoparticle-Amplified Potentiometric Response." Oral presentation at the conference Trends in Nanotechnology (TNT2023), Lyon, France, September 2023.

"Soft, flexible, and conductive composite polycaprolactone/molybdenum films: A new type of reliable electrode materials for fully biodegradable electrochemical biosensors." Poster presentation at the Seventh International Symposium Frontiers in Polymer Science, Gothenburg, Sweden, May 2023.

"Biodetection platforms based on the extended gate FETs." Invited lecture at the Hengstberger Symposium on "Bioelectronics: mimicking and interfacing biological systems", Heidelberg, Germany, May 2023.

"Extended-gate field-effect transistor-based platform for multiplexed sensing of biomolecules using gold nanoparticle-enhanced potentiometric measurement format." Oral presentation at the 8th International Winterschool on Bioelectronics (BioEl 2023), Kirchberg in Tirol, Austria, March 2023.

"Optimization of the Extended Gate Field-Effect Transistor-Based Biosensing Platform for the Detection of Biomolecular Interactions." Oral presentation at the 12th International Conference "Nanomaterials: Applications & Properties" (IEEE NAP-2022), Kraków, Poland, September 2022.

"Standalone extended gate FET-based multiplexed sensing platform." Flash poster presentation at the European Biosensor Symposium Digital Seminar: Emerging trends in bioelectronics, October 2021.

"Standalone extended gate FET-based multiplexed sensing platform." Poster presentation at the NanoNet+ Annual Workshop, Klingenberg, Germany, September 2021.

"Synthesis, characterization and toxicity studies of gelatin modified zinc oxide nanoparticles." Oral presentation at the Eighteenth Young Researchers' Conference - Materials Science and Engineering, Belgrade, Serbia, December 2019.

"Composite hydrogel reservoirs for controlled delivery of cationic drugs." Poster presentation at the Sixth International Symposium Frontiers in Polymer Science, Budapest, Hungary, May 2019.

"Comparative properties of composite poly(lactic-*co*-glycolic acid)/poly(acrylic acid) implants synthesized using ultraviolet and gamma irradiation." Oral presentation at the Seventeenth Young Researchers' Conference - Materials Science and Engineering, Belgrade, Serbia, December 2018.

"Biodegradable polymer/hydrogel composite for controlled delivery of cationic formulations." Oral presentation at the Sixteenth Young Researchers' Conference - Materials Science and Engineering, Belgrade, Serbia, December 2017.

"Simulating fluid flow in "Shrinky Dink" microfluidic chips - potential for combination with low-cost DIY microPIV." Oral presentation at the IEEE East-West Design & Test Symposium (EWDTS'2017), Novi Sad, Serbia, September 2017.

"Simple programmable current source for controlled delivery via iontophoresis." Oral presentation at the 61st Conference for Electronics, Telecommunications, Computing, Automatics and Nuclear engineering, ETRAN 2017, Kladovo, Serbia, June 2017. In Serbian.

"pH-sensitive membranes with crosslinked poly(acrylic acid) hydrogel for controlled delivery." Oral presentation at the Fifteenth Young Researchers' Conference - Materials Science and Engineering, Belgrade, Serbia, December 2016.

"Reliable low-cost experimental setup for material synthesis modification by applying alternating electric fields." Oral presentation at the Fourteenth Young Researchers' Conference - Materials Science and Engineering, Belgrade, Serbia, December 2015.

"Acquisition of index fingertip time-resolved optical transmission spectra." Oral and poster presentation at the Student Conference on Medical Engineering Science 2013, Luebeck, Germany, March 2013.

RESEARCH FUNDING AND GRANTS

Co-investigator in the Osteology Project (No. 21-078) – "Oxygenation and lactate real-time monitoring for enhanced tissue regeneration in maxillofacial surgery: a novel electrochemical sensor prototype trial", Grant, Osteology Foundation, Lucerne, Switzerland, 30000 CHF, Principal Investigator: Dr. Tom Alexander Schröder (02.01.2022–31.01.2024)

SKILLS AND TECHNIQUES

Experimental: Engineering of electronic devices; Lithography; Microelectrode fabrication; Electrochemical analysis (impedance spectroscopy, amperometry, and voltammetry); Design and fabrication of microfluidic chips; Engineering of flow control systems; Design, synthesis, and characterization of biomaterials; Bioconjugation techniques; Optical microscopy; Scanning

electron microscopy; FTIR spectroscopy; UV-Vis spectroscopy; Thermal analysis (differential scanning calorimetry and thermogravimetry).

Software: Electronic design and hardware programming (LTspice, EAGLE, EasyEDA, and Arduino IDE); Programming and scientific computing (MATLAB and Python); Data Acquisition (NI LabVIEW); Data analysis (Origin, GraphPad Prism, and R); Modeling (COMSOL Multiphysics and MATLAB); Image analysis and processing (ImageJ and GIMP); Visualization (Inkscape).

TEACHING EXPERIENCE

2016–2021 **Teaching Assistant,** Department of Microelectronics and Technical Physics, School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

- Prepared and delivered standard course activities (lectures, recitations, exercises, assignments, and exams) and graded the student coursework for 11 undergraduate level courses attended by around 250 students per year
- Created innovative laboratory exercises, workshops, and research projects for students
- Received an overall average rating of 4.8/5.0 for teaching effectiveness

2014–2016 **Teaching Associate**, Department of Microelectronics and Technical Physics, School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

- Instructed students through recitations and guided the laboratory exercises in several courses related to physics, materials science, and sensors

2007–2011 **Program Assistant,** Chemistry Program, Petnica Science Center, Serbia

- Supervised short-term research projects conducted by high school students
- Trained students in scientific methodology, experimental techniques, and data analysis
- Worked in the institution that is a regional leader in scientific methodology training and the development of scientific literacy

ACADEMIC SERVICE

Deputy Head of Department (Jan. 2023–present), Department of Nano-Microsystems for Life Sciences, Institute of Radiopharmaceutical Cancer Research, Helmholtz-Zentrum Dresden-Rossendorf, Dresden, Germany

Reviewer, Materials & Design, Frontiers in Bioengineering and Biotechnology, Journal of Materials Science, Molecular Biotechnology, Chemical Industry, International Conference on Electrical, Electronic and Computing Engineering (IcETRAN)

Bachelor Thesis Committee Member (2014–2021), School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

Chairperson (Dec. 2017, Dec. 2018, Dec. 2019), Young Researchers' Conference - Materials Science and Engineering, Belgrade, Serbia

Ethics Committee Member (Spring 2018), School of Electrical Engineering, University of Belgrade, Belgrade, Serbia

Organizer and Workshop Moderator (Apr. 2018), FABelgrade 2018 (convention dedicated to promotion of digital fabrication and fab lab concept), Belgrade Youth Center, Belgrade, Serbia

Organizer (Sept. 2015), Final Annual Meeting of the COST Action TD1004 - Theragnostics Imaging and Therapy: An Action to Develop Novel Nanosized Systems for Imaging-Guided Drug Delivery, Serbian Academy of Sciences and Arts, Belgrade, Serbia

MEMBERSHIPS

The Society for Electronics, Telecommunications, Computing, Automatics and Nuclear engineering (ETRAN), Belgrade, Serbia, 2019

Fab Initiative, Belgrade, Serbia, 2018–2020

HONORS AND AWARDS

Recognized Reviewer Certificate, Materials & Design, Elsevier, Oct. 2022

Poster Award, Student Conference on Medical Engineering Science 2013, Luebeck, Germany, Mar. 2013

LANGUAGES

Serbian: native speaker; **English:** full professional proficiency;
German: professional working proficiency; **Spanish:** elementary proficiency.

REFEREES

Dr. Larysa Baraban, Department Head, Institute of Radiopharmaceutical Cancer Research, Helmholtz-Zentrum Dresden-Rossendorf, e-mail: l.baraban@hzdr.de (research referee)

Dr. Filip Radovanović, Senior Research Associate (retired), Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, e-mail: rfiver1@gmail.com (graduate advisor)

Dr. Ivana Gadjanski Stanić, Associate Research Professor, BioSense Institute, University of Novi Sad, e-mail: igadjanski@biosense.rs (research referee)

Dr. Marko Krstić, Associate Professor, School of Electrical Engineering, University of Belgrade, e-mail: marko.krstic@etf.bg.ac.rs (teaching referee)