

# Curriculum Vitae

## Personal information

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## Academic career

- 2017-            Group Leader, Research Group for Implantable Microsystems, Faculty of Information Technology & Bionics (ITK), Pázmány Péter Catholic University (PPCU)
- 2015-2017    Group Leader, Research Group for Implantable Microsystems, Institute for Technical Physics & Material Science, Centre for Energy Research, Hungarian Academy of Sciences
- 2014-2015    Alexander von Humboldt Postdoctoral Fellow, Microsystem Materials Laboratory, Department of Microsystem Engineering (IMTEK), University of Freiburg, Germany (12 months)
- 2009 - 2014   Research Fellow, Research Centre for Natural Sciences, Hungarian Academy of Sciences

## Industrial career

- 2021.            Project consultant at ONGO Vettech Ltd. (11 months)
- 2018.            Development Engineer at Microfluidlabs Ltd. (4 months)
- 2016.            Co-founder of Neuromicrosystems Ltd.
- 2013.            Development Engineer at Norma Diagnostics Ltd. (6 months)

## Education & Degrees

- 2022.            Habilitation in Electrical Engineering at the Faculty of Information Technology & Bionics, Pázmány Péter Catholic University
- 2013.            PhD in Electrical Engineering, Budapest University of Technology & Economics
- 2009.            Msc in Electrical Engineering, Budapest University of Technology & Economics

## Research Projects as Principal Investigator

2023-2024	Validation of high-precision in vivo drug delivery with integrated piezoelectric micropump in freely moving rodents (Group Linkage Program of the Alexander von Humboldt Foundation, Germany), funding: 55 kEUR
2022-2026	Intracortical infrared neuromodulation in freely behaving rodents: a stable, implantable platform for translational research, NAP2022-I-8/2022, appr. 273 kEUR
2020-2024	Improving functionalities of microscale brain-machine interfaces using integrated upconverting nanoparticles, project ID: NKFIH FK 134403, appr. 115 kEUR
2020-2022	Human translational neuroMEMS research aided by artificial intelligence, Thematic Excellence Program, ID: TKP2020-NKA-11, 240 kEUR
2020-2021	Application of softening polymers to map cortical activity, project ID: 2019-2.1.11-TÉT-2019-00002, 10 kEUR
2019-2020	Human translational neuroMEMS research, Thematic Excellence Program TUDFO/51757-1/2019-ITM, 120 kEUR
2018-2021	In vivo characterization of multimodal microdevices for infrared neural stimulation, 2017_1.2.1-NKP-2017-00002, 300 kEUR
2017.	Acquisition of process and characterization equipment for micro- and nanomachining, KTIA_NAP_13-2-2017-0008, 80 kEUR
2016-2020	Investigation of novel implant materials for high-resolution, multiparametric imaging of cortical activity, NKFIH 120143, 156 kEUR
2015-2017	Optical stimulation of hippocampus and deep brain regions using novel micro- and nanomachining approaches, National Brain Research Program, KTIA NAP B 13-2-2015-0004, 300 kEUR
2015-2018	Understanding the impact of nanostructuring to control neural cell - solid surface interactions at brain-machine interfaces, OTKA NN 116550 – senior researcher / co-PI, 93 kEUR
2013-2015	Development of MEMS based measurement system for testing pharmacons in freely moving rodents (industrial R&D project funded by Gedeon Richter Plc), 65 kEUR

## **Supervision of students**

27 Master & Bachelor students; 5 PhD students (4 with successfully thesis defense)

## **Teaching**

- 2016 - BioMEMS: miniaturized biosensors, postgraduate course at the University of Óbuda (course leader)
- 2016 - Technology & applications of polymer based bionic interfaces, postgraduate course at the University of Óbuda (course leader)
- 2019 - Applications of Neural Microsystems course for the Info-bionics Engineering Msc at PPCU (course leader)

## **Editorial roles in international scientific journals**

Scientific Reports (Springer Nature), Editorial Board Member  
Open Engineering (de Gruyter), Editorial Board Member  
Sensors (MDPI), Topic Editor

## **Ad hoc reviewer for international journals**

Sensors & Actuators A:Physical, Sensors & Actuators B:Chemical, Sensors (MDPI), Journal of Micromechanics & Microengineering , Scientific Reports, Nanoscale, J Neural Engineering, Lab on a Chip, Nature Communication, Small, Advanced Materials, Acta Biomaterialia, Advanced Science

## **Evaluator of scientific proposals**

National Research, Development & Innovation Office (HU), European Committee (H2020, Horizon Europe), Swiss National Science Foundation, Latvian Research Council

## **Awards**

- 2013 Postdoctoral Fellowship, Hungarian Academy of Sciences
- 2013 Prize of the Memorial Foundation of György Ferenczi
- 2014 Postdoctoral Fellowship of the Alexander von Humboldt Foundation, Germany
- 2015 Return Fellowship of the Alexander von Humboldt Foundation, Germany
- 2016 Reviewer of the Year at Journal of Micromechanics & Microengineering, IOP Pub.
- 2017 Outstanding Reviewer at Journal of Micromechanics & Microengineering, IOP Pub.
- 2018 János Bolyai Scholarship of the Hungarian Academy of Sciences
- 2019 New National Excellence Program Scholarship of the Ministry of Human Capacities
- 2019 Publication Award for Senior Scientists, PPCU
- 2020 New National Excellence Program Scholarship of the Ministry of Innov. & Techn.
- 2020 Reviewer of the Year, Journal of Neural Engineering, IOP Pub.
- 2020 Publication Award for Senior Scientists, PPCU
- 2021 New National Excellence Program Scholarship of the Ministry of Innov. & Techn.
- 2022 Certificate for Outstanding work in János Bolyai Scholarship, Hungarian Acad. of Sci.
- 2023 János Bolyai Scholarship of the Hungarian Academy of Sciences (2<sup>nd</sup> time)

## Scientometrics

Number peer-reviewed scientific articles: 48 (33 as first/corresponding author)

Cumulative impact factor: 202.316

Number of independent citations: 977

Hirsch-index: 17

## Patents

[2] Z. Fekete, Á. C. Horváth, I. Ulbert, Medical device to measure bioelectronic signals in conjunction with optical stimulation, Patent ID: 231 504

[1] A. Pongrácz, Z. Fekete, A. Zátanyi, Á. Szabó, R. Hodován, C. Lázár, B. Csernyus, Multimodal, intracranial implantable sensor array, patent ID: 5701

## List of publications in peer-reviewed international journals

[48] Á.C. Horváth, Á. Mórocz, B. Csomai, Á. Szabó, Zs. Balogh-Lantos, P. Fürjes, E. Z. Tóth, R. Fiáth, Z. Fekete, Silicon Optrode with a Micromirror-Tip Providing Tunable Beam Profile During Infrared Neuromodulation of the Rat Neocortex, *ADVANCED MATERIALS TECHNOLOGIES* in press (2024), <https://doi.org/10.1002/admt.202400044>, IF: 6.4, Q1/D1

[47] E. Ismaiel, R. Fiáth, Á. Szabó, Á. C. Horváth, Z. Fekete, Thermal neuromodulation using pulsed and continuous infrared illumination in a penicillin-induced acute epilepsy model. *SCIENTIFIC REPORTS* 13 (2023) 14460. IF: 4.6, D1/Q1

[46] M. Madarász, F.Z. Fedor, Z. Fekete\*, & B. Rózsa, Immunohistological responses in mice implanted with Parylene HT–ITO ECoG devices. *FRONTIERS IN NEUROSCIENCE* 17 (2023) 1209913. IF: 4.3, Q2

[45] Z. Fekete\*, A. Kaszás, M. Madarász, A. Zátanyi, A. Slézia, Transparent neural interfaces: challenges and solutions of microengineered multimodal implants designed to discover intact neuronal populations using high-resolution electrophysiology and microscopy simultaneously, *MICROSYSTEMS & NANOENGINEERING* 9 (2023) 66, IF: 8.006, D1/Q1

[44] M. i Soler, C. Hidalgo, Z. Fekete, L. Zalanyi, ISM Khalil, M. Yeste, V. Magdanz, Bundle Formation of Sperm: Influence of Environmental Factors, *FRONTIERS IN ENDOCRINOLOGY* 13 (2022) 957684, IF: 6.055, Q1

[43] Á Szabó, M Madarász, Zs. Lantos, A. Zátanyi, V. Danda, L. Spurgin, C. Manz, B. Rózsa, Z. Fekete\*, Transparent thiol-ene/acrylate based microECoG devices used for concurrent recording of fluorescent Calcium signals and electrophysiology in awake animals, *ADVANCED MATERIALS INTERFACES* 9 (2022) 2200729, IF: 6.389, D1/Q1

[42] Á. Cs. Horváth, S. Borbély, F. Mihók, P. Fürjes, P. Barthó, Z. Fekete\*, Histological and electrophysiological evidence on the safe operation of a sharp-tip multimodal optrode during infrared neuromodulation of the rat cortex, *SCIENTIFIC REPORTS* 12 (2022) 11434, IF: 4.996, D1/Q1

[41] E. Ismaiel, A. Zátanyi, Z. Fekete\*, Dimensionality Reduction and Prediction of Impedance data of Biointerface Based on Novel Approach, *SENSORS*, 22(11), 4191. IF: 3.847, Q1

[40] F. Z. Fedor, M. Madarász, A. Zátanyi, Á. Szabó, T. Lőrincz, V. Danda, L. Spurgin, C. Manz, B. Rózsa, Z. Fekete\*, Soft, thiol-ene/acrylate based electrode array for long-term recording of intracranial EEG

signals with improved biocompatibility in mice, *ADVANCED MATERIALS TECHNOLOGIES* 7 (2022) 2100942, IF: 8.856, D1/Q1

[39] B. Csernyus, Á. Szabó, R. Fiáth, A. Zátanyi, Cs. Lázár, A. Pongrácz, Z. Fekete\*, A multimodal, implantable sensor array and measurement system to investigate the suppression of focal epileptic seizure using hypothermia, *JOURNAL OF NEURAL ENGINEERING* 18 (2021) 0460c3, IF: 5.043, Q1

[38] Á. Szabó, Hanna Liliom, Z. Fekete\*, K. Schlett, A. Pongrácz, SU-8 microstructures alter the attachment and growth of glial cells in vitro, *MATERIALS TODAY COMMUNICATIONS* 27 (2021) 102336, IF: 3.662, Q2

[37] N. Ebrahimi, C Bi, D J Cappelleri, G. Ciuti, A. T. Conn, D. Faivre, N. Habibi, A. Hošovský, V. Iacovacci, I. S. M. Khalil, V. Magdanz, S. Misra, C. Pawashe, R. Rashidifar, P. Rodriguez, M. Sitti, Z. Fekete, A. Jafari, Magnetic Actuation Methods in Bio/Soft Robotics, *ADVANCED FUNCTIONAL MATERIALS* 31 (2021) 2005137, IF: 19.924, D1/Q1

[36] F.Z. Fedor, A. Zátanyi, D. Cserpán, Z. Somogyvári, Z. Borhegyi, G. Juhász, Z. Fekete\*, Application of a flexible polymer microECoG array to map functional coherence in schizophrenia model, *METHODS* 7 (2020) 101117, SC: 1.8

[35] F.Z. Fedor, C. Paraczký, L. Ravasz, Z. Borhegyi, Z. Somogyvári, G. Juhász, Z. Fekete, Electrophysiological and behavioral properties of 4-aminopyridine-induced epileptic activity in mice. *BIOLOGIA FUTURA* 71 (2020) 427–434

[34] Z. Fekete\*, Á. C. Horváth, A. Zátanyi, Infrared neuromodulation: a neuroengineering perspective, *JOURNAL OF NEURAL ENGINEERING* 17 (2020) 051003, IF: 5.379, Q1

[33] B. Csernyus, Á. Szabó, A. Zátanyi, R. Hodován, Cs. Lázár, Z. Fekete\*, L. Eröss, A. Pongrácz, Recent antiepileptic and neuroprotective approaches of brain cooling, *SEIZURE: EUROPEAN JOURNAL OF EPILEPSY* 82 (2020) 80-90, IF: 3.184, Q2

[32] Á. C. Horváth, Ö. C. Boros, L. Komáromi, S. Borbély, P. Koppa, P. Barthó, Z. Fekete\*, Infrared neural stimulation and inhibition using an implantable silicon photonic microdevice, *MICROSYSTEMS & NANOENGINEERING* 6 (2020) 44, IF: 7.127, D1/Q1

[31] A. Zátanyi, M. Madarász, Á. Szabó, T. Lőrincz, R. Hodován, B. Rózsa, Z. Fekete\*, Transparent, low-autofluorescence microECoG device for simultaneous Ca<sup>2+</sup> imaging and cortical electrophysiology in vivo, *JOURNAL OF NEURAL ENGINEERING* 17 (2020) 016062, IF: 5.379, Q1

[30] M. Csernai, S. Borbély, K. Kocsis, D. Burka, Z. Fekete, V. Balogh, S Káli, Z Emri, P. Barthó, Dynamics of sleep oscillations is coupled to brain temperature on multiple scales, *THE JOURNAL OF NEUROPHYSIOLOGY* 597 (2019) 4069-4086, IF: 4.547, D1/Q1

[29] H. Liliom, P. Lajer, Zs. Bérces, B. Csernyus, Á. Szabó, D. Pinke, P. Lőw, Z. Fekete, A. Pongrácz, K. Schlett, Comparing the effects of uncoated nanostructured surfaces on primary neurons and astrocytes, *JOURNAL OF BIOMEDICAL MATERIALS RESEARCH: PART A* 107 (2019) 2350-2359, IF: 3.525, Q1

[28] Ö. C. Boros, Á. C. Horváth, S. Beleznai, Ö. Sepsi, D. Csósz, Z. Fekete, P. Koppa, Optimization of an optrode microdevice for infrared neural stimulation *APPLIED OPTICS* 58 (2019) 3870-3876, IF: 1.961, Q1

- [27] F. Larramendy, S. Yoshida, D. Maier, Z. Fekete\*, S. Takeuchi, O. Paul, 3D arrays of microcages by two-photon lithography by spatial organization of living cells, LAB ON A CHIP 19 (2019) 875-884, IF: 6.774, D1/Q1
- [26] A Zátanyi, G. Orbán, R. Modi, G. Márton, D. Meszéna, I. Ulbert, A. Pongrácz, M. Ecker, W.E. Voit, A. Joshi-Imre, Z. Fekete\*, A softening laminar electrode for recording single unit activity from the rat hippocampus, SCIENTIFIC REPORTS 9 (2019) 37237, IF: 3.998, D1/Q1
- [25] Zs. Bérces, J. Pomothy, Á. Cs. Horváth, T. Kőhidi, É. Benyei, Z. Fekete\*, E. Madarász, A. Pongrácz, Effect of nanostructures on anchoring stem cell-derived neural tissue to artificial surfaces, JOURNAL OF NEURAL ENGINEERING 15 (2018) 056030, IF: 4.551, D1/Q1
- [24] Ö.C. Boros, Á.C. Horváth, S. Beleznai, Ö. Sepsi, S. Lenk, Z. Fekete, P. Koppa, Optical and thermal modeling of an optrode microdevice for infrared neural stimulation, APPLIED OPTICS 57 (2018) 6952-6957, IF: 1.973, Q1
- [23] A. Zátanyi, F. Fedor, Zs. Borhegyi, Z. Fekete\*, In vitro and in vivo stability of black-platinum coatings on flexible, polymer microECoG arrays, JOURNAL OF NEURAL ENGINEERING 15 (2018) 0453003, IF: 4.551, D1/Q1
- [22] A. Zátanyi, Zs. Borhegyi, M. Srivastava, D. Cserpán, Z. Somogyvári, Z. Kisvárday, Z. Fekete\*, Functional brain mapping using optical imaging of intrinsic signals and simultaneous high-resolution cortical electrophysiology with a flexible, transparent microelectrode array, SENSORS & ACTUATORS B-CHEMICAL 273 (2018) 519-526, IF: 6.393, D1/Q1
- [21] Á. Cs. Horváth, Ö. Cs. Boros, Sz. Beleznai, Ö. Sepsi, P. Koppa, Z. Fekete\*, A multimodal microtool for spatially controlled infrared neural stimulation in the deep brain tissue, SENSORS & ACTUATORS B-CHEMICAL 263 (2018) 77-86, IF: 6.393, D1/Q1
- [20] Z. Fekete\*, M. Csernai, K. Kocsis, Á. Cs. Horváth, A. Pongrácz, P. Barthó, Simultaneous in vivo recording of local brain temperature and electrophysiological signals with a novel neural probe, JOURNAL OF NEURAL ENGINEERING 14 (2017) 034001, IF: 3.92, Q1
- [19] Z. Fekete\*, A. Pongrácz, Multifunctional soft implants to monitor and control neural activity in the central and peripheral nervous system: a review, SENSORS & ACTUATORS B-CHEMICAL 243 (2017) 1214-1223, IF: 5.667, D1/Q1
- [18] Zs. Bérces, K. Tóth, G. Márton, I. Pál, B. Kováts-Megyesi, Z. Fekete, I. Ulbert, A. Pongrácz, Neurobiochemical changes in the vicinity of a nanostructured neural implant. SCIENTIFIC REPORTS 6 (2016) 35944, IF: 4.259, D1/Q1
- [17] G Márton, P Baracska, B Cseri, B Plósz, G Juhász, Z Fekete, A Pongrácz: A silicon-based microelectrode array with a microdrive for monitoring brainstem regions of freely moving rats, JOURNAL OF NEURAL ENGINEERING 13 (2016) 026025, 2016, IF: 3.465, D1/Q1
- [16] Z. Fekete\*, E. Pálfi, G. Márton, M. Handbauer, Zs. Bérces, I. Ulbert, A. Pongrácz, L. Négyessy, Combined in vivo recording of neural signals and iontophoretic injection of pathway tracers using a hollow silicon microelectrode, SENSORS & ACTUATORS B-CHEMICAL 236 (2016) 815-824, IF: 5.401, D1/Q1
- [15] M Kiss, P Földesy, Z Fekete\*, Optimization of a Michigan-type silicon microprobe for infrared neural stimulation, SENSORS & ACTUATORS B: CHEMICAL 224 (2016) 676-682, IF: 5.401, D1/Q1

- [14] Z Fekete\*, Recent advances in silicon-based neural microelectrodes and microsystems, SENSORS & ACTUATORS B: CHEMICAL 2015 (2015) 300-315, IF: 4.758, D1/Q1
- [13] I Rajta, R Huszánk, ATT Szabó, GUL Nagy, S Szilasi, P Fürjes, E Holczer, Z Fekete, G Járvás, M Szigeti, L Hajba, J Bodnár, A Guttman, Tilted pillar array fabrication by the combination of proton beam writing and soft lithography for microfluidic cell capture: Part 1 Design and feasibility, ELECTROPHORESIS 37 (2015) 498-503, IF: 2.482, Q2
- [12] Z Fekete\*, A. Németh, G. Márton, I. Ulbert, A. Pongrácz, Experimental study on the mechanical interaction between silicon neural microprobes and rat dura mater during insertion, JOURNAL OF MATERIAL SCIENCE: MATERIALS SCIENCE IN MEDICINE 26 pp. 70 (2015) IF: 2.272, Q2
- [11] Z Fekete\*, Technology of ultralong deep brain fluidic microelectrodes combined with etching-before-grinding, MICROSYSTEM TECHNOLOGIES 21 (2015) 341-344, IF: 0.974, Q2
- [10] P Fürjes, EG Holczer, E Tóth, K Iván, Z Fekete, D Bernier, F Dortu, D Giannone, PDMS microfluidics developed for polymer based photonic biosensors, MICROSYSTEM TECHNOLOGIES 21:(3) pp. 581-590. (2015), IF: 0.974, Q2
- [9] G Márton, I Bakos, Z Fekete, I Ulbert, A Pongrácz, Durability of high surface area platinum deposits on microelectrode arrays for acute neural recordings, J MATER SCI MATER MED. 25 (2014) 931-940, IF: 2.587, Q2
- [8] Z. Fekete\*, Á Cs Horváth, Zs. Bérces, A. Pongrácz: Black poly-silicon: a nanostructured seed layer for sensor applications, SENSORS AND ACTUATORS A: PHYSICAL 216 (2014) 277-286, IF: 1.903, Q1
- [7] G Márton, Z Fekete, R Fiáth, P Baracska, I Ulbert, G Juhász, G Battistig, A Pongrácz: In vivo measurements with robust silicon based multielectrode arrays with extreme shaft lengths, IEEE SENSORS JOURNAL 13:(9) (2013) 3262, IF: 1.8, Q1
- [6] Z Fekete\*, Z Hajnal, G Márton, P Fürjes, A Pongrácz: Fracture analysis of silicon microprobes designed for deep-brain stimulation, MICROELECTRONIC ENGINEERING 103 (2013) 160-166, IF: 1.338, Q1
- [5] A Pongrácz, Z Fekete, G Márton, Zs Bérces, I Ulbert, P Fürjes: Deep-brain silicon multielectrodes for simultaneous neural recording and drug delivery, SENSORS & ACTUATORS B-CHEMICAL 189 (2013) 97-105, IF: 3.840, D1/Q1
- [4] Z Fekete\*, A Pongrácz, P Fürjes, G Battistig: Improved process flow for buried channel fabrication in silicon, MICROSYSTEM TECHNOLOGIES 18 (2012) 353-358, IF: 0.86, Q2
- [3] Z Fekete\*, P Nagy, G Huszka, F Tolner, A Pongrácz, P Fürjes: Performance characterization of micromachined particle separation system based on Zweifach-Fung effect, SENSORS AND ACTUATORS B-CHEMICAL 162 (2012) 89-94, IF: 3.535, D1/Q1
- [2] Z Fekete\*, B Sinkovics, I Rajta, G A B Gál, P Fürjes, Characterization of the end-of-range geometric effects in complex 3D silicon micro-components formed by proton beam writing, JOURNAL OF MICROMECHANICS AND MICROENGINEERING 20: p. 064015. (2010), IF: 2.27, Q1
- [1] Rajta I, Szilasi SZ, Fürjes P, Fekete Z, Dücső Cs, Si micro-turbine by proton beam writing and porous silicon micromachining, NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION

B-BEAM INTERACTIONS WITH MATERIALS AND ATOMS 267:(12-13) pp. 2292-2295. (2009), IF: 1.156,  
Q2