

## PERSONAL DATA

PLACE & DATE OF BIRTH: Rome, Italy | 08 June 1989  
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## ACADEMIC APPOINTMENTS

2021 - PostDoctoral Researcher, ETH - Zürich, Switzerland  
*Laboratory for Soft Materials and Interfaces*

## ACADEMIC DEGREES

2014 - 2019 Ph.D, Technion - Israel Institute of Technology, Haifa, Israel  
*Advisor: Prof. Moran Bercovici (Technion) and Dr. Govind V. Kaigala (IBM Research)*

2011 - 2013 M.Sc., *cum laude*, Nanotechnology Engineering, 'Sapienza' University of Rome, Italy  
*Thesis advisor: Prof. Carlo Massimo Casciola (Sapienza) and Ir. Alwin Verschueren (Philips)*

2007 - 2010 B.Sc., Chemical Engineering, 'Sapienza' University of Rome, Italy

## PROFESSIONAL EXPERIENCE

02/19 - 02/21 PostDoctoral Researcher, [IBM Research - Zürich](#), Switzerland

11/18 - 01/19 Visiting Scholar, Faculty of Mechanical Engineering, University of Texas at Austin, US

07/14 - 10/18 Early-Stage Researcher - Marie-Curie Program  
2016 - 2018 [Precision Diagnostic Group, IBM Research - Zürich](#), Switzerland  
2014 - 2016 [Microfluidic Technologies Laboratory, Technion](#), Haifa, Israel

07/13 - 06/14 Materials Engineer, [Magneti Marelli](#) and [Centro Ricerche FIAT](#) (joint position), Bologna, Italy

08/12 - 02/13 Research Engineer, [Philips R&D](#), Eindhoven, The Netherlands

01/12 - 07/12 Treasurer, [ESN Roma ASE](#), 'Sapienza' - University of Rome, Italy

## RESEARCH EXPERIENCE AND INTERESTS

Electrokinetics, Transport Phenomena, Micro/Nano Fabrication, Surface Chemistry, Bio-Molecular Analysis, Electrophoretic Separations, Machine Learning, *In-Vitro* Medical Diagnostics, Multiphase flows.

## AWARDS AND HONORS

06/2019 Best poster award, Gordon Research Conference, Physics and Chemistry of Microfluidics

06/2019 Arthur Shavit Award for best PhD thesis, Faculty of Mechanical Engineering, Technion

01/2013 M.Sc. graduation *summa cum laude*

02/2010 Scholarship - Department of Chemical Engineering, 'Sapienza' University of Rome

02/2009 Erasmus scholarship, Faculty of Chemistry, Complutense - University of Madrid

## RESEARCH GRANTS

03/19 - 02/20 "Bidirectional flow filter: high-purity filtration of biomolecules in sub-microliter volumes using electrically driven microfluidics", *Swiss National Science Foundation, BRIDGE Proof-of-Concept [40B1-O 191549], 130K CHF (~122K EUR)*.

03/21 - 09/21 Extension for "Bidirectional flow filter: high-purity filtration of biomolecules in sub-microliter volumes using electrically driven microfluidics", *Swiss National Science Foundation, BRIDGE Proof-of-Concept [40B1-O 191549], 65K CHF (~60K EUR)*.

## PUBLICATIONS

### REFEREED PAPERS IN PROFESSIONAL JOURNALS

- J1. Probst D., Manica M., Y.G.N., Castrogiovanni A., **Paratore F.**, Laino T., "Molecular Transformer-aided Biocatalysed Synthesis Planning", *submitted, Nature Catalysis*, 2021.
- J2. Gabay I., **Paratore F.**, Boyko E., Ramos A., Gat A., Bercovici M., "Shaping liquid films by dielectrophoresis", *under revision, Flow*, 2021.
- J3. **Paratore F.\***, Bacheva V.\*, Bercovici M., Kaigala G. V., "Reconfigurable Microfluidics", *under revision, Nature Reviews Chemistry*, 2020. (\* equal contribution)
- J4. Boyko E., Bacheva V., Eigenbrod M., **Paratore F.‡**, Gat A.‡, Hardt S.‡, Bercovici M.‡, "Microscale hydrodynamic cloaking and shielding via electroosmosis", *Physical Review Letters*, 2021, **126**, 184502. (‡ corresponding authors)
- J5. Widerker D., **Paratore F.**, Bercovici M., Kaigala G. V., "Biointegrated fluidic milling", *Advanced Material Technologies* 2021, **6**, 2000843.
- J6. Bacheva V.\*, **Paratore F.\***, Kaigala G. V. and Bercovici M., "Tunable Bidirectional Electroosmotic Flow for Diffusion-Based Separations", *Angewandte Chemie* 2020, **59**, 12894–12899. (\* equal contribution) - Selected as 'Very important paper'
- J7. **Paratore F.**, Bacheva V., Kaigala G. V., Bercovici M., "Dynamic microscale flow patterning using electrical modulation of zeta potential", *Proceedings of the National Academy of Sciences*, 2019, **116** (21) 10258-10263.  
- Featured on *Physics World*
- J8. **Paratore F.**, Boyko E., Kaigala G. V., Bercovici M., "Electroosmotic flow dipole: Experimental observation and flow field patterning", *Physical Review Letters*, 2019, **122**, 224502.
- J9. **Paratore F.**, Zeidman Kalman T., Rosenfeld T., Kaigala G. V., Bercovici M., "Isotachophoresis-Based Surface Immunoassay", *Analytical Chemistry*, 2017, **89** (14), pp 7373–7381.  
- Featured on the *cover page of Analytical Chemistry – Vol. 89, Iss. 14.*  
- Featured on the *IBM Research Blog, Technion website, Technology Network, EET Asia, ScienceNews.*
- J10. Arshavsky-Graham S., Massad-Ivanir N., **Paratore F.**, Scheper T., Bercovici M., Segal E., "On Chip Protein Pre-Concentration for Enhancing the Sensitivity of Porous Silicon Biosensors", *ACS Sensors*, 2017, **2** (12), pp 1767–1773.

### REFEREED PAPERS IN CONFERENCE PROCEEDINGS

Presenters are underlined.

- J11. Gabay I., **Paratore F.**, Boyko E., Ramos A., Gat A., Bercovici M., "Dielectrophoretic-driven deformations of a free surface", *The 25th International Congress of Theoretical and Applied Mechanics (25th ICTAM)*, 22 - 27 August 2021, Milan, Italy.
- J12. Widerker D., **Paratore F.**, Bercovici M., Kaigala G. V., "Biointegrated Subtractive Microfabrication by Hydrodynamic Flow Confinement", *2020 IEEE 33rd International Conference on Micro Electro Mechanical Systems (MEMS)*, Vancouver, BC, Canada, pp. 102-105, 2020.
- J13. **Paratore F.**, Bacheva V., Rubin S., Bercovici M., Kaigala G. V., "Diffusion-Based Separation Using Non-Uniform Electroosmotic Flow", *Proceedings of the 22nd International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS2018)*, Kaohsiung, Taiwan, Nov 11–15, 2018.
- J14. **Paratore F.**, Boyko E., Gat A., Kaigala G. V., Bercovici M., "Toward Microscale Flow Control Using Non-Uniform Electro-Osmotic Flow", *Proceedings of SPIE 10491, Microfluidics, BioMEMS, and Medical Microsystems XVI, 10491OP*, SPIE BiOS, 2018, San Francisco, California, United States. (invited)
- J15. **Paratore F.**, Boyko E., Kaigala G. V., Bercovici M., "Patterning Electro-Osmotic Flow Using Non-Uniform Surface Charge in a Hele-Shaw Cell", *Proceedings of the 21st International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS2017)*, Savannah, Georgia, Oct 22 – 27, 2017.

- J16. Arshavsky-Graham S., Vilneski R., **Paratore F.**, Bercovici M., Segal E., "1,000-fold Sensitivity Enhancement of Porous Si-based Optical Biosensors for Nucleic Acid and Proteins Detection", in *Optics in the Life Sciences Congress*, OSA Technical Digest, Optical Society of America, 2017. (invited)
- J17. **Paratore F.**, Zeidman Kalman T., Rosenfeld T., Kaigala G. V., Bercovici M., "Isotachophoresis-Based Surface Immunoassay", *Proceedings of the 20th International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS2016)*, Dublin, Ireland, Oct 9 – 13, 2016.

## PATENTS AND PATENT APPLICATIONS

- P1. Bercovici M., **Paratore F.**, Widerker D., Kaigala G., "Biointegrated subtractive microfabrication by hydrodynamic flow confinement", Provisional Patent Application (P202000057US01), Jan 2020.
- P2. Knoll A., Schwemmer C. M., **Paratore F.**, Ruggeri F., Wolf H., Nicollier P. M., "Nanoparticle Trapping and Transport by modulating the Zeta Potential", Provisional Patent Application (P201911101US01), Aug 2020.
- P3. Bercovici M., **Paratore F.**, Bacheva V., Kaigala G., "Device and Methods for flow control using electro-osmotic flow", Provisional Patent Application (P202007474US01), Aug 2020.
- P4. Bercovici M., **Paratore F.**, Gökçe O., Kaigala G., van Kooten X., "Electrokinetically separating, encapsulating and extracting analytes on a microfluidic device", Provisional Patent Application (US20200061616A1), Aug 2018.
- P5. Bercovici M., **Paratore F.**, Rubin S., Bacheva V., Kaigala G., "Device and Methods for flow control using electro-osmotic flow", Provisional Patent Application (WO2019003230), Jun 2017.
- P6. Bercovici M., Kaigala G., van Kooten X., Ostromohov N., **Paratore F.**, "Device and method for isotachophoretic focusing of large sample volumes", Provisional Patent Application (US20190310227A1), Oct 2016.
- P7. Kaigala G., Bercovici M., Ostromohov N., van Kooten X., **Paratore F.**, "Characterizing kinetic responses of a ligand-functionalized surface", US10564158B2, Jul 2016.

## NON-REFEREED CONFERENCES AND PUBLICATIONS

### ORAL PRESENTATION

Presenters are underlined.

- C1. Bacheva V., **Paratore F.**, Dolev M., Rofman B., Kaigala G., Bercovici M., "Diffusion-based Separation and Extraction using Bidirectional Electroosmotic Flow", *37th International Symposium on Microscale Separations and Bioanalysis, July 12-15, 2021, Boston, Massachusetts, USA* (invited).
- C2. **Paratore F.**, "Till the last molecule: how to make the best use of your analyte in biosensing", as part of the workshop on "Sensors integration in microfluidics", *the 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS2020)*, online edition, Oct 3, 2020. (invited)
- C3. Bacheva V., **Paratore F.**, Rofman B., Bar-Dolev M., Kaigala G.V., Bercovici M., "Buffer-exchange Coronavirus detection using bidirectional flow", *36th International Symposium on Microscale separation and Bioanalysis (MSB 2020)*, Virtual Edition, September 30, 2020.
- C4. **Paratore F.**, Bacheva V., Kaigala G.V., Bercovici M., "Dynamic flow patterning with localized field effect electroosmosis", *ELKIN - 13th International Symposium on Electrokinetics, Massachusetts Institute of Technology, MA, US, Jun 12-14, 2019*.
- C5. **Paratore F.**, Bacheva V., Kaigala G.V., Bercovici M., "Dynamic Microscale Flow Patterning Using Non-Uniform Electroosmotic Flow", *Gordon Research Seminar, Physics and Chemistry of Microfluidics, Hong Kong, CN, Jun 15-16, 2019*.
- C6. Bacheva V., **Paratore F.**, Rubin S., Kaigala G.V., Bercovici M., "Field-effect electroosmotic flow patterning as a mechanism for diffusion-based separation", *35th International Symposium on Microscale Separations and Bioanalysis (MSB 2019)*, Corvallis, Oregon, US, March 25-28, 2019. ("Best oral presentation by a young scientist")

- C7. Bacheva V., Paratore F., Rubin S., Kaigala G.V., Bercovici M., "Diffusion-based separation using bidirectional electroosmotic flow", *22nd Annual Meeting of the Israel Analytical Chemistry Society (Isranalytica 2019)*, Tel Aviv, Israel, January 22-23, 2019.
- C8. Paratore F., Boyko E., Kaigala G.V., Bercovici M., "Microscale Flow Patterning by Dynamic Control of Surface Charge", *Gordon Research Seminar, Oscillation and Dynamic Instabilities in Chemical Systems*, Les Diablerets, Switzerland, Jul 07-08, 2018.
- C9. Paratore F., Zeidman Kalman T., Rosenfeld T., Kaigala G. V., Bercovici M., "Four Orders of Magnitude Enhancement of Surface Immunoassays Using Isotachopheresis-Driven Reactions", *Flow17 Micro and Nanofluidics Fundamentals and Applications*, Paris, France, Jul 03-05, 2017.

#### POSTER PRESENTATION

Presenters are underlined.

- C10. Paratore F., Bacheva V., Kaigala G.V., Bercovici M., "Dynamic Microscale Flow Patterning Using Non-Uniform Electroosmotic Flow", *Gordon Research Conference, Physics and Chemistry of Microfluidics*, Hong Kong, CN, Jun 16-21, 2019.
- C11. Paratore F., Bacheva V., Kaigala G.V., Bercovici M., "Diffusion-Based Separation using Bidirectional Electroosmotic Flow", *ELKIN - 13th International Symposium on Electrokinetics*, Massachusetts Institute of Technology, MA, US, Jun 12-14, 2019.
- C12. Paratore F., Bacheva V., Kaigala G.V., Bercovici M., "Dynamic Microscale Flow Patterning Using Non-Uniform Electroosmotic Flow", *Harrington Symposium - Physics of Microfluidics*, Austin, TX, US, Jun 09-11, 2019.
- C13. Paratore F., Bacheva V., Kaigala G.V., Bercovici M., "Diffusion-Based Separation using Bidirectional Electroosmotic Flow", *Harrington Symposium - Physics of Microfluidics*, Austin, TX, US, Jun 09-11, 2019.
- C14. Paratore F., Boyko E., Kaigala G.V., Bercovici M., "Patterning microscale flows using non-uniform surface charge", *71st Annual Meeting of the American Physical Society - Division of Fluid Mechanics*, Atlanta, GA, US, Nov 18-20, 2018.
- C15. Paratore F., Boyko E., Kaigala G.V., Bercovici M., "Microscale Flow Patterning by Dynamic Control of Surface Charge", *Gordon Research Conference, Oscillation and Dynamic Instabilities in Chemical Systems*, Les Diablerets, Switzerland, Jul 08-13, 2018.
- C16. Paratore F., Kaigala G. V., Bercovici M., "Experimental Demonstration of Flow Patterning in a Hele-Shaw Cell Using Non-Uniform Zeta Potential", *Flow17 Micro and Nanofluidics Fundamentals and Applications*, Paris, France, Jul 03 - 05, 2017.
- C17. Arshavsky-Graham S., Massad-Ivanir N., Paratore F., Bercovici M., Segal E., "Label-Free Optical Biosensors for Early Diagnosis of Pancreatic Cancer", *Batsheva de Rothschild Seminar on New Concepts in Biosensing*, Ein Bokek, Israel, Feb 12 - 17, 2017 (Best poster award).
- C18. Paratore F., Zeidman Kalman T., Rosenfeld T., Kaigala G. V., Bercovici M., "Isotachopheresis-Based Surface Immunoassay: Theory and Application", *Batsheva de Rothschild Seminar - Physics of Microfluidics*, Sde Boker, Israel, Jan 03 - 08, 2017.
- C19. Rubin S., Boyko E., Paratore F., Gat A. D., Kaigala G. V., Bercovici M., "Flow Patterning in Hele-Shaw Configuration Using Non-Uniform Electro-Osmotic Slip", *Batsheva de Rothschild Seminar - Physics of Microfluidics*, Jan 03 - 08, 2017.
- C20. Paratore F., Zeidman Kalman T., Rosenfeld T., Kaigala G. V., Bercovici M., "Isotachopheresis-Based Surface Immunoassay", *PhD Summer School: Micro- and Nano Sensors*, Kongens Lyngby, Denmark, Aug 15 - 26, 2016.

## PAPERS IN SCIENTIFIC NEWSLETTERS AND BLOG ARTICLES

- M1. Kaigala G. V., **Paratore F.**, "Novel microfluidic method for microscale bio separations", *IBM Blog*, April 11, 2020.
- M2. **Paratore F.**, Kaigala G. V., "Shaping Microscale Flows with Electric Fields", *IBM Blog*, May 13, 2019.
- M3. **Paratore F.**, "Come accelerare l'analisi di proteine con l'elettrocinetica", *01net Blog*, Aug 31, 2018.
- M4. van Kooten X.F., **Paratore F.**, Bercovici M., Kaigala G. V., "Highly sensitive biomarker analysis using on-chip electrokinetics", *ERCIM, News No. 111*, Oct 2017.

## INVITED LECTURES IN ACADEMIC COURSES

- L1. Lecturer in the course "Micro/Nanofluidics" held by Prof. Casciola C.M., *Sapienza, University of Rome, Italy*, 2020.
- L2. Lecturer in the course "Micro/Nanotechnology and Microfluidics for Biomedical Applications" held by Dr. Delamarche E., *ETH, Zurich, Switzerland*, 2020.
- L3. Lecturer in the course "Micro/Nanotechnology and Microfluidics for Biomedical Applications", held by Dr. Delamarche E., *ETH, Zurich, Switzerland*, 2019.
- L4. Lecturer in the course "Flow and transport in microdevices" held by Prof. Bercovici M., *Faculty of Mechanical Engineering, Technion, Israel*, 2016.

## GRADUATE STUDENT SUPERVISION

- S1 Hanut Vemulapalli, M.Sc. Thesis, 'The electric microfluidic probe (eMFP) - A novel electrohydrodynamic probe for "open-space" microfluidic applications', EPFL, 2019. Supervision at IBM: **Paratore F.**, Kaigala G. V.; Academic supervisor: Prof. Nikolaos Stergiopoulos.
- S2 Vesna Bacheva, M.Sc. Thesis, 'Diffusion-based separation using bidirectional electroosmotic flow', EPFL, 2018. Supervision at IBM: **Paratore F.**, Kaigala G. V.; Academic supervisor: Prof. Philippe Renaud.