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Curriculum vitae  
**GILAD YOSSFIFON**  
Associate Professor

**PERSONAL**

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<http://MNFL.technion.ac.il> (Lab)

**ACADEMIC DEGREES**

2008 Ph.D.,  
Tel-Aviv University, Israel

2003 M.Sc. *with distinction*  
Electrical Engineering, Tel-Aviv University, Israel

1999 M.Sc.  
Mechanical Engineering, Technion – Israel Institute of Technology, Israel

1994 B.Sc. *Summa Cum Laude*  
Mechanical Engineering, Technion – Israel Institute of Technology, Israel

**ACADEMIC APPOINTMENTS**

11/2015 Associate Professor, Faculty of Mechanical Engineering, Technion – I.I.T.,  
Haifa, Israel

2012- 11/2015 Assistant Professor, Faculty of Mechanical Engineering, Technion – I.I.T.,  
Haifa, Israel

2009-2012 Senior Lecturer<sup>†</sup>, Faculty of Mechanical Engineering, Technion – I.I.T,  
Haifa, Israel

2007-2009 Post-Doctoral Research Associate, Chemical and Biomolecular Engineering  
Department, University of Notre Dame, Indiana, USA

**RESEARCH INTERESTS**

Electrohydrodynamics and Electrokinetics  
Self-propelling Nano/Micromotors (Nano/Microbots)  
Active particles  
Ion transport through permselective media  
Induced-charge-electro-kinetics  
Lab-on-a-chip devices  
Micro-heat exchangers

<sup>†</sup> Position title was changed from “Senior Lecturer” to “Assistant Professor” during 2012

**Refereed papers in professional journals**

(Names of students/postdocs are underlined>

**Published papers**

- J1. G. Yossifon, M. B. Rubin, and A. L. Yarin, Penetration of a Rigid Projectile into a Finite Thickness Elastic-Plastic Target – Comparison between Theory and Numerical Computations, *Int. J. Impact Engng.* 25: 265-290 (2001).
- J2. G. Yossifon, A. L. Yarin, and M. B. Rubin, Penetration of a Rigid Projectile into a Multi-Layered Target: Theory and Numerical Computations, *Int. J. Engng. Sci.* 40:1381-1401 (2002).
- J3. G. Yossifon and A. L. Yarin, Behind-the-armor Debris Analysis, *Int. J. Impact Engng.* 27:807-835 (2002).
- J4. G. Yossifon, I. Frankel and T. Miloh, On electro-osmotic flows through microchannel junctions, *Physics of Fluids* 18:117108-1-9 (2006).
- J5. G. Yossifon, I. Frankel and T. Miloh, Symmetry breaking in induced-charge electro-osmosis over polarizable spheroids, *Physics of Fluids* 19: 068105-1-4 (2007).
- J6. G. Yossifon and H. -C. Chang, Selection of Nonequilibrium Overlimiting Currents: Universal Depletion Layer Formation Dynamics and Vortex Instability, *Phys. Rev. Lett.* 101:254501-1-4 (2008).
- J7. G. Yossifon, I. Frankel and T. Miloh, Macro-scale description of transient electrokinetic phenomena over polarizable dielectric solids, *J. Fluid Mech.* 620: 241-262 (2009).
- J8. G. Yossifon, P. Mushenheim, Y. -C. Chang and H. -C. Chang, Nonlinear Current-Voltage Characteristics of Nanochannels, *Phys. Rev. E* 79:046305-1-9 (2009).
- J9. Y. Eckstein, G. Yossifon, A. Seifert and T. Miloh, Nonlinear electrokinetic phenomena around nearly insulated sharp tips in microflows, *J. Colloid Interface Sci.* 338:243-249 (2009).
- J10. G. Yossifon, Y. -C. Chang and H. -C. Chang, Rectification, Gating Voltage, and Interchannel Communication of Nanoslot Arrays due to Asymmetric Entrance Space Charge Polarization, *Phys. Rev. Lett.* 103:154502-1-4 (2009).
- J11. G. Yossifon, P. Mushenheim, Y. -C. Chang, and H. -C. Chang, Eliminating the Limiting-Current Phenomenon by Geometric Field Focusing into Nanopores and Nanoslots, *Phys. Rev. E* 81:046301-1-13 (2010).
- J12. G. Yossifon and H. -C. Chang, Changing Nanoslot Ion Flux with a Dynamic Nanocolloid Ion-Selective Filter: Secondary Overlimiting Currents due to Nanocolloid-Nanoslot Interaction, *Phys. Rev. E* 81:066317-1-6 (2010).
- J13. G. Yossifon, P. Mushenheim and H. -C. Chang, Controlling nanoslot overlimiting current with the depth of a connecting microchamber, *Euro. Phys. Lett.* 90:64004-1-6 (2010).
- J14. F. Xie, Y. Wang, W. Wang, Z. Li, G. Yossifon and H. -C. Chang, Preparation of Rhombus-Shaped Micro/Nanofluidic Channels with Dimensions Ranging from Hundred Nanometers to Several Micrometers, *J. Nanoscience and Nanotechnology* 10:7277-7281 (2010).
- J15. I. Frankel, G. Yossifon, and T. Miloh, Diplophoresis of dielectric spheroids under asymmetric fields, *Physics of Fluids* 24:012004-1-12 (2012).

- J16. J. Schiffbauer and G. Yossifon, Role of Electro-osmosis in the Impedance Response of Microchannel-Nanochannel Interfaces, *Phys. Rev. E* 86:056309-1-9 (2012).
- J17. Y. Green and G. Yossifon, Dynamical Trapping of Colloids at the Stagnation Points of Electro-Osmotic Vortices of the Second Kind, *Phys. Rev. E.* 87:033005-1-9 (2013).
- J18. J. Schiffbauer, S. Park and G. Yossifon, Electrical Impedance Spectroscopy of Microchannel-Nanochannel Interface Devices, *Phys. Rev. Lett.* 110:204504-1-5 (2013).
- J19. L. Rozitsky, A. Fine, D. Dado, S. Nussbaum-Ben-Shaul, S. Levenberg and G. Yossifon, Quantifying continuous-flow dielectrophoretic trapping of cells and micro-particles on micro-electrode array, *Biomed Microdevices* 15:859–865 (2013).
- J20. A. Boymelgreen, G. Yossifon, S. Park and T. Miloh, Spinning Janus doublets driven in uniform ac electric fields, *Phys. Rev. E.* 89:011003(R)-1-5 (2014).
- J21. Y. Green and G. Yossifon, Effects of three-dimensional geometric field focusing on concentration polarization in a heterogeneous permselective system, *Phys. Rev. E.* 89:013024-1-11 (2014).
- J22. J. Schiffbauer, U. Liel, and G. Yossifon, Concentration dependence of nanochannel impedance and the determination of surface charge, *Phys. Rev. E.* 89:033017-1-9 (2014).
- J23. Y. Green, S. Shloush, and G. Yossifon, Effect of geometry on concentration polarization in realistic heterogeneous permselective systems, *Phys. Rev. E.* 89:043015-1-9 (2014).
- J24. S. Park, D. Ben Bassat and G. Yossifon, Individually addressable multi-chamber electroporation platform with dielectrophoresis and alternating-current-electro-osmosis assisted cell positioning, *Biomicrofluidics* 8:024117-1-15 (2014).
- J25. J. Schiffbauer and G. Yossifon, Influence of electric-double-layer structure on the transient response of nanochannels, *Phys. Rev. E.* 89:053015-1-8 (2014).
- J26. M. Zehavi and G. Yossifon, Particle Dynamics and Rapid Trapping in Electro-Osmotic Flow Around a Sharp Microchannel Corner, *Physics of Fluids* 26:082002-1-13 (2014).
- J27. D. Ben-Bassat, A. Boymelgreen and G. Yossifon, The Influence of Flow Intensity and Field Frequency on Continuous-Flow Dielectrophoretic Trapping, *J. Colloid Interface Science* 442:154–161 (2015).
- J28. Y. Green, S. Park and G. Yossifon, Bridging the gap between an isolated nanochannel and a communicating multipore heterogeneous membrane, *Phys. Rev. E.* 91:011002(R)-1-6 (2015).
- J29. Y. Green and G. Yossifon, Time-dependent ion transport in heterogeneous permselective systems, *Phys. Rev. E.* 91:063001-1-11 (2015).
- J30. J. Schiffbauer, U. Liel, N. Leibowitz, S. Park and G. Yossifon, Probing space charge and resolving overlimiting current mechanisms at the microchannel-nanochannel interface, *Phys. Rev. E.* 92:013001-1-6 (2015).
- J31. J. Schiffbauer, N. Leibowitz and G. Yossifon, Extended space charge near nonideally selective membranes and nanochannels, *Phys. Rev. E.* 92:013002-1-8 (2015).
- J32. A. Boymelgreen and G. Yossifon, Observing Electrokinetic Janus Particle-Channel Wall Interaction Using Micro-Particle-Image-Velocimetry, *Langmuir* 31:8243–8250 (2015).

- J33. T. Ben-Arye, S. Park, J. Shemesh, D. Peer, S. Levenberg and G. Yossifon, Dielectrophoretic Characterization of Cells in a Stationary Nanoliter Droplet Array with Generated Chemical Gradients, *Biomed Microdevices* 17:91 (2015).
- J34. Y. Green, Y. Edri, and G. Yossifon, Asymmetry-induced electric current rectification in permselective systems, *Phys. Rev. E*. 92:033018-1-12 (2015).
- J35. L. Rosentsvit, W. Wang, J. Schiffbauer, H.-C. Chang, and G. Yossifon, Ion Current Rectification in Funnel-Shaped Nanochannels: Hysteresis and Inversion Effects, *The Journal of Chemical Physics* 143:224706-1-5 (2015).
- J36. Y. Yan , J. Schiffbauer , G. Yossifon , H.-C. Chang, Universal Low-Frequency Asymptotes of Dynamic Conic Nanopore Rectification: An Ionic Nanofluidic Inductor, *The Journal of Chemical Physics* 143: 224705-1-4 (2015).
- J37. A. Parahovnik, L. Fraiman, I. Rosinsky, G. Yossifon, Temperature and high pressure effects on choked flow in the microchannel, *Physics of Fluids* 28, 022005-1-7 (2016).
- J38. Y. Green, R. Eshel, S. Park and G. Yossifon, Interplay between nanochannel and microchannel resistances, *Nanoletters* 16, 2744–2748 (2016).
- J39. M. Zehavi, A. Boymelgreen and G. Yossifon, Competition between Induced-Charge Electro-Osmosis and Electro-Thermal Effects around a Weakly-Polarizable Microchannel Corner, *Phys. Rev. Appl.* 5, 044013-1-13 (2016).
- J40. T.-Po Yang, G. Yossifon and Y.-T. Yang, Characterization of the near-field and convective transport behavior of micro and nanoparticles in nanoscale plasmonic optical lattices, *Biomicrofluidics* 10, 034102-1-11 (2016).
- J41. U. Liel, N. Leibowitz, J. Schiffbauer, S. Park and G. Yossifon, Effect of field-focusing and ion selectivity on the extended space charge developed at the microchannel-nanochannel interface, *J. Phys.: Condens. Matter* 28, 324002-1-8 (2016).
- J42. S. Park and G. Yossifon, Induced-Charge Electro-Kinetics, Bipolar Current and Concentration-Polarization in a Microchannel-Nafion Membrane System, *Phys. Rev. E*. 93, 062614-1-10 (2016).
- J43. Y. Yan, Y. Wang, S. Senapati, J. Schiffbauer, G. Yossifon, and H.-C. Chang, Robust ion current oscillations under a steady electric field: An ion channel analog, *Phys. Rev. E*, 94, 022613 (2016).
- J44. A. Boymelgreen, G. Yossifon and T. Miloh, Propulsion of Active Colloids by Self-Induced Field Gradients, *Langmuir* 32, 9540–9547 (2016).
- J45. J. Ben-David, S. D. Atkinson, Y. Pollak, G. Yossifon, U. Shavit, J. L. Bartholomew and T. Lotan, Myxozoan polar tubules display structural and functional variation, *Parasites & Vectors*, 9:549, 1-6 (2016).
- J46. Y.-C. Chen, G. Yossifon, and Y.-T. Yang, Suppression of photothermal convection of micro particles in two dimensional nanoplasmonic optical lattice, *Applied Phys. Letters*, 109, 201111-1-5 (2016).
- J47. S. Park, G. Piriatskiy, D. Zeevi, J. Ben-David, G. Yossifon, U. Shavit and T. Lotan, Nematocyst's stinging is driven by the tubule moving front, *Journal of the Royal Society Interface*, 14: 20160917 (2017).

- J48. A. Parahovnik , N. Tzabar, Y. Haas, L. Parahovnik, I. Rosinsky, G. Yossifon, Evaluation of axial conduction effects and heat losses in counter-flow microscale heat exchangers, *Applied Thermal Engineering*, 121, 1095–1101 (2017).
- J49. S. Park, D. Capelin, G. Piriatskiy, T. Lotan, G. Yossifon, Dielectrophoretic characterization and isolation of jellyfish stinging capsules, *Electrophoresis* 38, 1996–2003 (2017).
- J50. L. Rosentsvit, S. Park and G. Yossifon, Effect of Advection on Transient Ion Concentration-Polarization Phenomenon, *Phys. Rev. E*. 96, 023104 (2017).
- J51. G. Piriatskiy, S. D. Atkinson, S. Park, D. Morgenstern, V. Brekhman, G. Yossifon, J. L. Bartholomew and T. Lotan, Functional and proteomic analysis of Ceratonova shasta (Cnidaria: Myxozoa) polar capsules reveals adaptations to parasitism, *Scientific reports*, 7:9010 (2017).
- J52. A. Mosyak, E. Galilib, D. Daniel, I. Rozinsky, B. Rosen, G. Yossifon, Thermodynamics of a brazier cooking system modeled to mimic the lead brazier of a Roman ship, *Journal of Archaeological Science: Reports* 16, 19–26 (2017).
- J53. A. Boymelgreen, T. Balli, T. Miloh and G. Yossifon, Mobile Microelectrodes: Unified Label-Free Selective Cargo Transport by Active Colloids, *Nature Communications* 9:760 (2018).
- J54. N. Leibowitz, J. Schiffbauer, S. Park and G. Yossifon, The Transient Response of a Non-Ideal Ion Selective Microchannel-Nanochannel Devices, *Phys. Rev. E*. 97, 043104 (2018).
- J55. S. Park and G. Yossifon, Electrothermal based active control of ion transport in a microfluidic device with an ionpermselective membrane, *Nanoscale* 10, 11633 – 11641 (2018).
- J56. C. W. Shields, K. Han, F. Ma, T. Miloh, G. Yossifon and O. D. Velev, Supercolloidal Spinners: Complex Active Particles for Electrically Powered and Switchable Rotation, *Advanced Functional Materials* 1803465(1-7) (2018).
- J57. D. Daniel, A. Mosyak, R. Akhvlediani, A. Hoffman, G. Yossifon, Enhanced cooling of electronic chips using combined diamond coating and microfluidics, *Phys. Rev. Applied* 11, 014047 (2019).
- J58. S. Park and G. Yossifon, Combining dielectrophoresis and concentration polarization-based preconcentration to enhance bead-based immunoassay sensitivity, *Nanoscale*, DOI: 10.1039/c9nr02506e (2019).
- J59. S. Shuchat, S. Park, S. Kol and G. Yossifon, Distinct and independent dielectrophoretic behavior of the head and tail of sperm and its potential for the safe sorting and isolation of rare spermatozoa, *Electrophoresis*, 0, 1-9 (2019).
- J60. S. Park, R. Abu-Rjal, L. Rosentsvit and G. Yossifon, Novel flow sensor based on sensing the convective-diffusive ionic concentration layer, *ACS sensors*, 4, 7, 1806-1815 (2019).
- J61. X. Huo and G. Yossifon, Significant enhancement of the electrorheological effect by non-straight electrode geometry, *Soft Matter*, DOI: 10.1039/c9sm00819e (2019).

J62. R. Abu-Rjal, N. Leibowitz, S. Park, B. Zaltzman, I. Rubinstein, and G. Yossifon, Signature of electroconvective instability in transient galvanostatic and potentiostatic modes in a microchannel-nanoslot device, *Phys. Rev. Fluids* 4, 084203 (2019).

### **Accepted papers**

J63. X. Huo and G. Yossifon, Tunable electrorheological fluid microfluidic rectifier: irreversibility of viscous flow due to spatial asymmetry induced memory effects, *Phys. Rev. Lett.* (2019).

J64. Y. Wu, A. Fu, and G. Yossifon, Active Particles as Mobile Microelectrodes for Selective Bacteria Electroporation and Transport, *Science Advances* (2019).

### **Submitted papers**

J65. L. Fraiman, A. Parahovnik, I. Rosinsky, and G. Yossifon, Geometrical optimization of counter-flow heat exchanger integrated within a microfabricated Joule-Thomson cryocooler, *International Journal of Heat and Mass Transfer*.

J66. S. Park and G. Yossifon, Electrothermal active control of preconcentrated biomolecule plugs, *Analytical Chemistry*.

J67. X. Huo, Y. Wu, A. Boymelgreen and G. Yossifon, Analysis of cargo loading modes and capacity of an electrically-powered active carrier, *Langmuir*.

J68. Y. Wu, A. Fu, and G. Yossifon, Active Particle Based Selective Transport and Release of Cell Organelles.

J69. T. Bauerochs, X. Huo, G. Yossifon, S. Ulrich, S. Schneider, R. Bruns, Description and visualization of the highly dynamic behavior of the ER-effect, *Journal of Intelligent Material Systems and Structures*.

J70. S. Park and G. Yossifon, Micromotor-Based Biosensing Using Label-Free and Directed Transport of Functionalized Beads, *ACS Sensors*.

### **Review papers**

#### **Published papers**

J71. H. -C. Chang and G. Yossifon, Understanding Electrokinetics at the Nanoscale: A Perspective, *Biomicrofluidics* 3:012001-1-15 (2009).

J72. H. -C. Chang, G. Yossifon and E. A. Demekhin, Nanoscale Electrokinetics and Microvortices: How Microhydrodynamics affects Nanofluidic Ion Flux, *Annual Review of Fluid Mechanics* 44:401-426 (2012).

### **Patents**

P1. H. -C. Chang, P. Mushenheim S. Basuray, G. Yossifon, and S. Senapati, Microchamber Electrochemical Cell having a Nanoslot, US 8,969,007, Mar. 3, 2015.

P2. G. Yossifon and M. Zehavi, Concentration-Polarization based Flowmeter, Application No. 239691, June 28, 2015.

P3. G. Yossifon and A. Boymelgreen, Device and Method for Dielectrophoresis, Application No. 246027, June 5, 2016.

P4. G. Yossifon and P. Sinwook, Dynamic control of the concentration-polarization layer length in a microchannel-Nafion membrane system using electrothermal flow, Application No. 07035-P0075A, 17 Nov. 2017.

P5. G. Yossifon and S. Shuchat, Distinct and independent dielectrophoretic behaviour of the head and tail of sperm and its potential for the safe sorting and isolation of rare spermatozoa. Method and device, No. 07035-P0126A, 31 Dec. 2018.