

Curriculum Vitae

Tivony Ran, PhD

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ACADEMIC POSITIONS

- 01/08/2023: **Senior Lecturer (Assistant Prof. equiv.), Department of Chemical Engineering, Ben-Gurion University of the Negev, Israel.**
- 01/08/2022 – 31/07/2023: **Research associate, Cavendish Laboratory, University of Cambridge, UK.**
- 01/08/2020 – 31/07/2022: **Marie-Curie fellow, Cavendish Laboratory, University of Cambridge, UK.**
- 01/10/2018 – 31/07/2020: **Blavatnik fellow, Cavendish Laboratory, University of Cambridge, UK.**
- 01/06/2018 – 31/08/2018: **Research associate, Jacob Klein's laboratory, Weizmann Institute of Science, Israel.**
- 01/12/2016 – 31/05/2018: **Postdoctoral fellow, Jacob Klein's laboratory, Weizmann Institute of Science, Israel.**

EDUCATION

- 18/12/2011 – 30/11/2016: **Ph.D. in Chemistry, Weizmann Institute of Science.** Thesis title - "Interactions between dissimilar surfaces in aqueous media at controlled surface potentials", under the supervision of Prof. Jacob Klein.
- 22/10/2009 – 30/11/2011: **M.Sc. in Chemistry with specialization in Nanoscience and Nanotechnology, The Hebrew University of Jerusalem (*Magna cum Laude*).**
- 01/10/2006 – 1/10/2009: **B.Sc. in Chemistry with specialization in Medicinal Chemistry, The Hebrew University of Jerusalem (*Magna cum Laude*).**

PRIZES AND AWARDS

- 01/08/2020: **Marie-Curie Individual Fellowship (24 months full funding: £180,460, Grant no. 892333), Horizon 2020, European Union**
- 01/09/2019: **Research Associate, St. John's College, University of Cambridge**
- 01/10/2018: **Blavatnik postdoctoral fellowship (24 months full funding: £72,000), Blavatnik Family Foundation & The British Council**
- 12/09/2016: **Best Poster Award, Israel Vacuum Society 34th Annual Meeting**
- 08/05/2016: **1st Prize Poster Award, 2nd International Symposium on Nanotechnology: from Academy to Industry**
- 02/05/2016: **The Ministry of Science and Technology (Israel) Travel grant for conference attendance**
- 27/08/2014: **Travel Grant – Campus Asia Chemistry Summer School**
- 10/03/2010: **Kathleen Casali scholarship**
- 02/07/2009: **Hebrew University Center for Nanoscience and Nanotechnology scholarship**
- 27/01/2009: **Dean's list Of Excellency**

LIST OF PUBLICATIONS

1. Zhu, J., **Tivony, R.**, Bošković, F., Pereira-Dias, J., Sandler, S. E., Baker, S., & Keyser, U. F., Multiplexed Nanopore-Based Nucleic Acid Sensing and Bacterial Identification Using DNA Dumbbell Nanoswitches, *Journal of the American Chemical Society*, 2023. Impact factor: 16.383
2. Bošković, F., Zhu, J., **Tivony, R.**, Ohmann, A., Chen, K., Alawami, M. F., Dordevic, M., Ermann, N., Pereira-Dias, J., Fairhead, M., Howarth, M., & Keyser, U. F., Simultaneous identification of viruses and viral variants with programmable DNA nanobait, *Nature Nanotechnology*, 2023, 1-9. Impact factor: 40.523
3. Fletcher, M., Zhu, J., Rubio-Sanchez, R., Al Nahas, K., Di Michele, L., Keyser, U. F., and **Tivony, R.***. DNA-based optical quantification of ion transport across giant vesicles, *ACS Nano*, 2022, 16, 10, 17128-17138. (* Corresponding author). Impact factor: 18.072
4. **Tivony, R.***; Fletcher, M.; & Keyser, U., Quantifying proton-induced membrane polarization in single biomimetic giant vesicles, *Biophysical Journal*, 2022, 121, (12), 2223-2232. (* Corresponding author). Impact factor: 4.045
5. **Tivony, R.***; Fletcher, M.; Al Nahas, K.; & Keyser, U., A microfluidic platform for sequential assembly and separation of synthetic cell models. *ACS Synthetic Biology* 2021. 10.11: 3105-3116. (* Corresponding author). Impact factor: 5.249
6. **Tivony, R.**; Zhang, Y.; & Klein, J., Modulating Interfacial Energy Dissipation via Potential-Controlled Ion Trapping. *The Journal of Physical Chemistry C*, 2021, 125(6), 3616-3622. Impact factor: 4.177
7. Weckman, N. E.; Ermann, N.; Gutierrez, R.; Chen, K.; Graham, J.; **Tivony, R.**; Heron, A.; and Keyser, U. F., Multiplexed DNA identification using site specific dCas9 barcodes and nanopore sensing. *ACS sensors*, 2019, 4, no. 8: 2065-2072. Impact factor: 9.618
8. **Tivony, R.**; Safran, S.; Pincus, P.; Silbert, G.; and Klein, J., Charging dynamics of an individual nanopore. *Nature Communications*, 2018, 9.1, 4203. Impact factor: 17.763
9. **Tivony, R.** and Klein, J., Modifying surface forces through control of surface potentials. *Faraday Discussions*, 2017, 199, 116. Impact factor: 4.394
10. **Tivony, R.**; Iuster, N.; Klein, J., Probing the Surface Properties of Gold at Low Electrolyte Concentration. *Langmuir*, 2016, 32, (29), 7346-7355. Impact factor: 4.331
11. **Tivony, R.**; Yaakov, D. B.; Silbert, G.; Klein, J., Direct Observation of Confinement-Induced Charge Inversion at a Metal Surface. *Langmuir*, 2015, 31, (47), 12845-12849. Impact factor: 4.331
12. **Tivony, R.**; Larush, L.; Sela-Tavor, O.; Magdassi, S., Biomedical Imaging of Colorectal Cancer by Near Infrared Fluorescent Nanoparticles. *Journal of Biomedical Nanotechnology*, 2014, 10, (6), 1041-1048. Impact factor: 4.483
13. Frusic-Zlotkin, M.; Soroka, Y.; **Tivony, R.**; Larush, L.; Verkhovsky, L.; Bregegere, F. M.; Neuman, R.; Magdassi, S.; Milner, Y., Penetration and biological effects of topically applied cyclosporin A nanoparticles in a human skin organ culture inflammatory model. *Experimental Dermatology*, 2012, 21, (12), 938-43. Impact factor: 4.511

PATENTS

Magdassi, S., Lazarovici, P., Larush, L., Portnoy, E., Lecht, S., & **Tivony, R.**, Near infrared fluorescent particles and uses thereof, *U.S. Patent Application No. 13/822,095* (2011).

CONFERENCES AND WORKSHOPS

Invited talks

- **Elucidating cellular transport through building simplified cell models**, Spotlight talks, Imperial College London, UK, June 2023.
- **Less is more: elucidating cellular transport using simplified cell models**, Departmental seminar, Weizmann Institute of Science, Department of Chemical and Biological Physics, Israel, January 2023
- **Less is more: elucidating cellular transport using simplified cell models**, Departmental seminar, Bar-Ilan University, Department of Chemistry, Israel, December 2022
- **Utilizing ion flux for deciphering membrane polarization in synthetic cell models**, A random walk in soft matter – conference in honor of Jacob Klein, Weizmann Institute of Science, Israel, June, 2022.
- **Exploiting electric double layer perturbation: from measuring nanopore charging dynamics to friction regulation**, Surface Force Balance workshop, University of Oxford, UK, November 2019
- **Metal-Dielectric contact in aqueous electrolytes**, Soft Matter Symposium: Soft Contacts, Mechanics and Adhesion, University of Florida, Gainesville, Florida, USA, October 2016.
- **Direct observation of confinement-induced charge inversion at a metal surface**, COST workshop on – Reversible Control of Surface Interactions, University of Oxford, UK, September 2016.
- **Probing the surface properties of gold by surface force measurements**, Campus Asia summer school, Tohoku University, Sendai, Japan, August 2014.
- **Probing the surface properties of gold by surface force measurements**, Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, August 2014.

Contributed talks

- **Sequential Assembly and Separation of Synthetic Cell Models**, Institute of Physics (IOP), Early Career Research in Biophysical Physics, online via zoom, December 2021.
- **Continuous purification of cell-size vesicles on-chip**, LMU Munich-Cambridge symposium on biophysics/soft matter, online via zoom, April 2021.
- **Time-resolved charging dynamics of confined electric double layer**, International Soft Matter Conference, Edinburgh, UK, June 2019.
- **Charging dynamics of an individual nanopore**, Biological and Soft Systems research day, Harvey Court of Gonville and Caius college, Cambridge, UK, December 2018.
- **Modifying surface forces through control of surface potentials**, Israel Vacuum Society 35th annual conference, Weizmann Institute of Science, Israel, September 2017.
- **Time-resolved dynamics of confined electric double-layer via surface forces**, Cavendish laboratory, University of Cambridge, UK, April 2017.
- **Modifying surface forces through control of surface potentials**, Faraday Discussion Meeting on Chemical Physics of Electroactive Materials, University of Cambridge, UK, April 2017.
- **Measurement and manipulation of surface interactions in aqueous media**, Soft and biophysics student-run seminar, Weizmann Institute of Science, Israel, January 2017.
- **Direct observation of confinement-induced charge inversion at a metal surface**, Soft Matter at Aqueous Interfaces (SOMATAI), Crete, June 2016.

RESEARCH EXPERIENCE

Postdoctoral research, University of Cambridge

- Design of microfluidic channels using a computer-aided design software (AutoCAD).
- Fabrication of microfluidic devices using photolithography and soft lithography.
- Preparation and manipulation of giant unilamellar lipid vesicles using microfluidic-based approaches.
- Other liposome preparation approaches: electroformation, extrusion and freeze-thaw.
- Optofluidic experiments: giant unilamellar vesicles trapping and purification, membrane fusion and mass transport across lipid bilayers.
- Fluorescence and confocal microscopy.
- Python programming: Image analysis, object tracking and data processing.

Ph.D., Weizmann Institute of Science

- Surface Force Balance (SFB): force measurements between surfaces (normal forces, adhesion and friction).
- Surface chemistry: functionalization of surfaces through vapor phase and liquid phase adsorption.
- Development and design of a three-electrode configuration system for SFB and electrochemical measurements.
- Atomic Force Microscopy (AFM): Force spectroscopy and imaging of soft and hard surfaces.
- Electrochemical measurements: Cyclic voltammetry, Chronoamperometry, Differential capacitance, etc.
- Surface characterization techniques and instruments: X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), Scanning electron microscopy (SEM), Goniometer (Contact angle) and Ellipsometry.

M.Sc., The Hebrew University of Jerusalem

- Functionalization of nanoparticles through adsorption of surfactants, proteins and targeting agents (antibodies).
- Spectroscopic techniques: Fluorescent spectroscopy, UV/Vis spectroscopy, In-vivo Near Infrared spectroscopy and imaging.
- Preparation of emulsions, nanoemulsions and polymeric/drug nanoparticles.
- Encapsulation of fluorescent dyes and drug molecules.

B.Sc., The Hebrew University of Jerusalem

- Research assistant, School of pharmacy, The Hebrew University of Jerusalem, Israel.

TEACHING EXPERIENCE

- 15/02/2022: Lecturer, BioNano graduate lecture series course. Lecture title: Intersurface forces in biological systems. Lent term 2022.
- 01/03/2021: Lecturer, BioNano graduate lecture series course. Lecture title: Intersurface forces – fundamentals and measurement. Lent term 2021.
- 28/10/2019 – 16/01/2023: Head-of-Class of an undergraduate (part II) experimental physics laboratory class. Assignment description: teaching includes briefing and supervision of students in the lab, grading reports and conducting viva (oral) exams.
- 1/10/2019 – 30/11/19: Teaching an Advanced Atomic Force Microscopy practical for PhD students (NanoDTC). Maxwell centre, Department of Physics, University of Cambridge.
- 30/10/2017 – 05/03/2018: Teaching Assistant in the course: Soft matter – interactions, structure and dynamics.
- 26/10/2015 – 12/02/2016: Teaching Assistant in the course: Soft matter – interactions, structure and dynamics.
- 20/10/2010 – 10/01/2011: Lab instructor, Hadassah academic college, Jerusalem, Israel.

RESEARCH SUPERVISION

- 01/10/2019 – present: PhD co-supervisor (with Prof. Ulrich Keyser), University of Cambridge.
- 27/06/2016 – 25/03/2018: Research project mentoring of gifted high-school students, Davidson Institute for Science Education and the Ministry of Education. The research project constitutes the equivalent of five study units towards the matriculation certificate.
- 01/07/2012 – 08/08/2012: Supervisor of a visiting student, Farida Shagieva, Moscow State University.
- 27/05/2015 – 24/06/2015: Supervisor of a rotation master student, Yehuda Baum, Weizmann Institute of Science.

SERVICES

- 14/09/2022: PhD thesis external examiner, Department of Chemistry, University of Oxford.
- 16/04/2021: LMU Munich-Cambridge symposium on biophysics/soft matter (organizer), online.
- 01/09/2020 – 30/11/2021: Pre-dinner lecture series (organizer), St John's college, Cambridge.
- 10/06/2019 – 01/03/2021: Atomic Force Microscopy management and training instructor, Maxwell centre, Department of Physics, University of Cambridge.
- 01/08/2019: Biological and Biomedical Physics seminar (organizer), Biological and Soft System, Department of Physics.
- Reviewing activities:** ChemBioChem (Nov 2021), Angewandte Chemie (Nov 2022), ACS Synthetic Biology (Apr 2023), Chemistry – A European Journal (May 2023).

OUTREACH ACTIVITY

- 23/03/2019: **Cambridge Science Festival**, Presenting the nanopore sensing exhibit as part of the Science Festival, Cavendish Laboratory.
- 05/03/2013 – 13/04/2016: **Writing popular scientific articles in Davidson online website**, Davidson Institute for Science Education. In addition to writing tens of popular scientific articles, I also published articles in nrg and Haaretz, popular Israeli news websites, and translated various scientific movies.
- 17/12/2015 – 16/03/2016: **Creating TED-Ed animated video lesson, in collaboration with TED**, Lesson title: The invisible motion of still objects. Lesson theme: fundamentals of molecular motion.
- 22/03/2015: **Lecture at Almajd school, Taybeh as part of the science education week**, The lecture was given on a voluntary basis with the aim of exposing and encouraging junior high – school students in the periphery to study science.