

LEEYA ENGEL, Ph.D

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EDUCATION

Ph.D. Materials Engineering & Nanotechnologies, Tel Aviv University, Tel Aviv, Israel	2016
M.Sc. Materials Engineering & Nanotechnologies, Tel Aviv University, Tel Aviv, Israel	2014
B.Sc. Physics, The Hebrew University of Jerusalem, Jerusalem, Israel	2008

ACADEMIC APPOINTMENTS

Assistant Professor, Technion – Israel Institute of Technology, Haifa, Israel Oct 1, 2022

- Lead research in the Bio-MEMS lab in the Faculty of Mechanical Engineering.
- Advise graduate and undergraduate students, teach graduate and undergraduate level courses.

Postdoctoral Research Fellow, Stanford University, Stanford, CA, USA 2016-present

Project: Microfabricated cell culture platforms for cryo-EM and mechanobiology.

Advisors: Prof. Alex Dunn (Chem. Eng.), Prof. Beth Pruitt (Mech. Eng.), Prof. Bill Weis (Biology)

- Develop microsystem-based methods for cryo-electron microscopy (cryo-EM).
- Pioneered the use of extracellular matrix (ECM) micropatterning for 3D cryo-EM of cells, dramatically improving the rate of data acquisition.
- Study endothelial cell-cell junction architecture using cryo-EM tomography.
- Develop microfluidic platforms to spatially control stem cell differentiation.
- Develop silicon microelectromechanical systems (MEMS) to shear cell monolayers.

Graduate Student Researcher, Tel Aviv University, Tel Aviv, Israel 2011-2016

Project: Electroactive polymer (EAP) micro-actuators.

Advisors: Prof. Yosi Shacham (Electrical Eng.), Prof. Slava Krylov (Mech. Eng.)

- Developed micron-scale electroactive polymer sensors and actuators (polymer MEMS).
- Collaborated with the Dvir lab to design and microfabricate an electronic cardiac patch.
- Characterized smart materials in EU consortium using EAPs to treat cardiovascular disease.

Visiting Student Researcher, University of California, Berkeley, CA, USA 2015-2016

- Initiated collaboration with Lin (Mech. Eng.) and Arias (Electrical Eng.) labs to develop an integrated system for stimulating electroactive hydrogels using printed electrodes.

Undergraduate Student Researcher, The Hebrew University of Jerusalem, Israel 2006-2007

- Explored the effect of UV exposure on hydrogel crosslinking in the lab of Prof. Eran Sharon.

HONORS & AWARDS

Postdoctoral Award, Israeli Council for Higher Education (VATAT)	2017
Stanford ChEM-H Mechanobiology Postdoctoral Fellowship	2016
AVS Nellie Yeoh Whetten Award: National Student Award, American Vacuum Society	2015
International Travel Grant, Israel Ministry of Science	2015
NA'AMAT Award for Women in Engineering Sciences	2015
Excellence Award for Advising Electrical Eng. M.Sc Project (A. Klein), Tel Aviv University	2013
Excellence Award for Advising Electrical Eng. M.Sc Project (S. Kruk), Tel Aviv University	2013
Marian Gertner Medical Nanosystems Fellowship	2013
Dean's Award for Outstanding Achievement, Tel Aviv University	2013

Academic Excellence Award in Materials and Nanotechnologies, Tel Aviv University	2012
Dorothy M. and Earl S. Hoffman Travel Grant, American Vacuum Society (AVS)	2012
Best poster award at the 29 th Israel Vacuum Society conference	2011
Merit based scholarship of half tuition coverage, The Hebrew University	2005

PUBLICATIONS

15. **L. Engel***, C.G. Vasquez*, E.A. Montabana, B.M. Sow, M.P. Walkiewicz, W.I. Weis, A.R. Dunn (*equal contribution). Lattice micropatterning for cryo-electron tomography studies of cell-cell contacts. *Journal of Structural Biology* 213(4), 107791 (2021)
14. M. Garcia, E. Sadeghipour, **L. Engel**, W.J Nelson, B.L. Pruitt. MEMS Device for Applying Shear and Tension to an Epithelium combined with Fluorescent Live Cell Imaging. *J. Micromech. Microeng.* 30 125004. (2020)
13. K.W. Cui*, **L. Engel***, C.E. Dundes, T.C. Nguyen, K.M. Loh, A.R. Dunn (*equal contribution) Spatially controlled stem cell differentiation via morphogen gradients: A comparison of static and dynamic microfluidic platforms. *Journal of Vacuum Science & Technology A* 38 (033205). (2020) doi: 10.1116/1.5142012
12. **L. Engel**, G. Gaietta, L.P. Dow, M.F. Swift, G. Pardon, N. Volkmann, W.I. Weis, D. Hanein, B.L. Pruitt. Extracellular matrix micropatterning technology for whole cell cryogenic electron microscopy studies. *J. Micromech. Microeng.* 29 115018. (2019)
11. **L. Engel**, C. Liu, N. Hemed, Y. Khan, A. Arias, S. Krylov, Y. Shacham-Diamand, L. Lin. Local electrochemical control of hydrogel microactuators in microfluidics. *J. Micromech. Microeng.* 28 (10), 105005. (2018)
10. M. Ben David, **L. Engel**, Y. Shacham-Diamand. Spectroscopic Ellipsometry Study of Spin Coated P(VDF-TrFE-CTFE) Thin Films and P(VDF-TrFE-CTFE)/PMMA Blends. *Microelectronic Engineering.* 17, 37-43. (2017)
9. **L. Engel***, K.R. Van Volkinburg*, M. Ben-David, G.N. Washington, S. Krylov, Y. Shacham-Diamand (*equal contribution). Fabrication of a self-sensing electroactive polymer bimorph actuator based on polyvinylidene fluoride and its electrostrictive terpolymer. *Proc. SPIE 9798, Electroactive Polymer Actuators and Devices (EAPAD)*. (2016)
8. R. Feiner, **L. Engel**, S. Fleisher, M. Malki, A. Shapira, Y. Shacham-Diamand, T. Dvir Engineered hybrid cardiac patches with multifunctional electronics. *Nature Materials*. (2016) DOI: 10.1038/NMAT4590
7. K. Hakshur*, **L. Engel***, Y. Shacham-Diamand, S. Ruschin (*equal contribution) High surface area thermoplastic polymer films fabricated by mechanical tearing using nano-porous silicon. *Microelectronic Engineering* 150, 71-73. (2016)
6. **L. Engel**, S. Kruk, J. Shklovsky, S. Krylov, Y. Shacham-Diamand A study toward the development of an electromechanical poly(vinylidene fluoride-trifluoroethylene-chlorofluoroethylene) buckling membrane actuator. *J. Micromech. Microeng.* 24 (12), 125027. (2014)
5. N. Jackson, P. Verbrugghe, D. Cuypers, K. Adesanya, **L. Engel**, et al. A Cardiovascular Occlusion Method Based on the Use of a Smart Hydrogel. *IEEE Transactions on Biomedical Engineering* 62 (2), 399-406. (2014)
4. **L. Engel**, S. Krylov, Y. Shacham-Diamand Thermoplastic nano-imprint lithography of electro active polymer poly(vinylidene fluoride-trifluoroethylene-chlorofluoroethylene) for micro/nano scale sensors and actuators. *J. Micro/Nanolithography, MEMS, and MOEMS* 13 (3), 033011-033011. (2014)
3. **L. Engel**, O. Berkh, K. Adesanya, J. Shklovsky, P. Dubruel, S. Krylov, Y. Shacham-Diamand

Actuation of a novel Pluronic-based hydrogel: Electromechanical response and the role of applied current. *Sensors and Actuators B: Chemical* 191, 650-658. (2013)

2. J. Shklovsky*, **L. Engel***, Y. Sverdlov, S. Krylov, Y. Shacham-Diamand (*equal contribution) Nano-imprinting lithography of P(VDF-TrFE-CFE) for flexible freestanding MEMS devices. *Microelectronic Engineering*. 100, 41-46. (2012)
1. **L. Engel**, J. Shklovsky, D. Schreiber, S. Krylov, Y. Shacham-Diamand Freestanding smooth micron-scale polydimethylsiloxane (PDMS) membranes by thermal imprinting. *J. Micromech. Microeng.* 22 (4), 045003. (2012)

PATENTS

2. T. Dvir, Y. Shacham-Diamand, R. Feiner, **L. Engel** Electronic Scaffold and Uses Thereof. U.S. Patent App. 61/905,230. (2014)
1. F. Stam, N. Jackson, P. Dubruel, K. Adensanya, A. Embrechts, E. Mendes, H.P. Neves, P. Herijgers, P. Verbrugghe, Y. Shacham, **L. Engel**, S. Krylov Hydrogel based occlusion systems. U.S. Patent App. 13/832,069. (2013)

ORAL PRESENTATIONS AT INTERNATIONAL CONFERENCES

7. Microscopy & Microanalysis (M&M) 2021, Aug 5, 2021, Virtual. *Micropatterning of electron microscopy grids for improved cellular cryo-electron tomography throughput*
6. 45th International Conference on Micro and Nano Engineering (MNE), Sept 23-26, 2019, Rhodes, Greece. *Extracellular matrix protein micropatterning technology for whole cell cryogenic electron microscopy studies*
5. Materials Research Society (MRS) Fall Meeting and Exhibit, Nov 29-Dec 4, 2015, Boston, MA. *Electroactive Polymers for Integrated Medical Microsystems*
4. AVS 62nd International Symposium and Exhibition, Oct 18-23, 2015, San Jose, CA. *Frequency Based Deflection Control of a Self-sensing Electroactive Polymer Bimorph Actuator*
3. AVS 60th International Symposium and Exhibition, Oct 28-Nov 2, 2013, Long Beach, CA. *Nano-Imprinting Lithography of P(VDF-TrFE-CFE) for Flexible Freestanding Bio-MEMS Devices*
2. 39th International Conference on Micro and Nano Engineering (MNE), Sept 16-19, 2013, London, UK. *Thermoplastic Nano-Imprinting Lithography of Electro Active Polymer P(VDF-TrFE-CFE) for Nano Scale Sensors and Actuators*
1. AVS 59th International Symposium and Exhibition, Oct 28-Nov2, 2012, Tampa, FL.
 - a. *Electric-Stimulus-Responsive Pluronic Hydrogels as Actuators*
 - b. *Electroactive Polymeric MEMS Actuators Fabricated by Thermal Imprinting of P(VDF-TrFE-CFE) and Polydimethylsiloxane (PDMS)*

INVITED LECTURES

9. Alveole Tech Talk, ASCB/EMBO Cell Bio Virtual 2020, Dec 9, 2020 *Digging deeper into cellular mechanisms with micropatterning and cryo-ET*
8. Bay Area cryo-EM meeting, Feb 6, 2020, Dublin, CA *Micropatterning of ECM proteins on EM grids*
7. Nature.com research webinar hosted by Alvéole, Oct 15, 2019 *Micropatterning on EM grids: A strategy for improving cryo-ET workflow*
6. Cryo-ET Club, Stanford University, Sept. 4, 2019, Stanford, CA *Extracellular matrix micropatterning technology for whole cell cryogenic electron microscopy studies*

5. Seminar at Stanford University, Feb 9, 2015, Stanford, CA
Electroactive polymers for medical applications
4. Seminar at PARC, Oct 2, 2015, Palo Alto, CA
Electroactive polymer micro-actuator technologies
3. Women's Day Event at Tel Aviv University, March 8, 2015, Tel Aviv University, Tel Aviv, Israel
Invited representative of female engineering PhD students.
Micro/Nano Scale Sensors and Actuators Based on Electroactive Polymers
2. 1st Israel Vacuum Society (IVS) Annual Student Meeting, April 29, 2014, Tel Aviv, Israel
Electroactive Polymer Actuators
1. IEEE 27th Convention of Electrical and Electronics Engineers in Israel, Nov 14, 2012, Eilat, Israel.
Nano-Imprinting Lithography of P(VDF-TrFE-CFE) for Flexible Freestanding Bio-MEMS Devices

TEACHING EXPERIENCE

Guest Lecturer , Stanford University, Stanford, CA	
MATSCI 85N: Health Fab: Making Stuff for Life	2019
ME 342A: Mechanobiology and Biofabrication Methods (BIOPHYS 342A)	2017
Teaching Assistant , Tel Aviv University, Tel Aviv, Israel	
Linear Algebra, International School of Electrical Engineering	2013-2014
Materials Lab Instructor. Tensile testing & precipitation hardening	2011-2013
Physics I, School of Electrical Engineering	2011
GMAT/GRE Course Instructor & Assistant Director , MBA Center, Tel Aviv, Israel	2009-2011
Designed curriculum for eight-session GMAT math course, delivered weekly classes, and provided one-on-one tutoring for GMAT and GRE.	

MENTORING

Minsung Cho, Graduate Research Mentor, Stanford University	2021
Belle Sow, Undergraduate Research Mentor, Stanford University	2019-2020
Tina Nguyen, Mentor, Stanford University RISE Internship Program	2019
Liam Dow, Graduate Research Mentor, Stanford University	2018-2019
Vivek Gupta, Graduate Research Mentor, Stanford University	2017
Chengming Liu, Undergraduate Research Mentor, UC Berkeley	2016-2017
Moti Ben-David, M.Sc. Research Mentor, Tel Aviv University	2016
Dimitry Mazor, M.Sc. Research Mentor, Tel Aviv University	2015
Shahar Kruk, M.Sc. Research Mentor, Tel Aviv University (excellence award)	2013
Amir Klein, M.Sc. Research Mentor, Tel Aviv University (excellence award)	2013

SERVICE & LEADERSHIP

- Serve on the Program Committee for the 65th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN) in 2022.
- Co-chair the Stanford University Postdoctoral Association (SURPAS) Justice Equity Diversity and Inclusion Committee (JEDI) since 2021.
- Serve on the Strategic Vision Team for the Vice Provost for Graduate Education and Postdoctoral Affairs (VPGE), Stanford University since 202.
- Served on the Program Committee for the 64th International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication (EIPBN) in 2021.
- Served on the Program Committee for EIPBN in 2020 (cancelled due to COVID-19).

- Organized the EM Grid Micropatterning Workshop at Stanford in 2020.
- Co-organized the CHEM-H Mechanobiology Symposium at Stanford in 2018 as part of the ChEM-H Interdisciplinary Postdoctoral Training Program in Quantitative Mechanobiology.
- Launched and co-chaired 1st and 2nd Israel Vacuum Society (IVS) Annual Student Meeting as founding president of student chapters of MRS and IVS in 2014 and 2015.
- Review for J Micromech Microeng, ACS Applied Materials & Interfaces, ACS Sustainable Chem Eng, Sensor Actuat A-Phys., JoVE, and BIOCELL.

INDEPENDENT FUNDING

ChEM-H Mechanobiology Postdoctoral Fellowship, Stanford University \$145k 7/2016-10/2019
Cell-cell adhesion studies using microfabricated force-sensing culture platforms

Postdoctoral Award, Israeli Council for Higher Education \$42k 1/2017-1/2019

LANGUAGES

English (Native), Hebrew (Fluent in reading, writing and speaking)