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R E S U M E

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ACADEMIC APPOINTMENTS

2025-Present ***Postdoctoral position*** in The Department of Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT). **Advisor**: Prof. Tal Cohen.

ACADEMIC DEGREES

2020-2025 ***Doctor of Philosophy*** direct track in Materials Science and Engineering, Technion – Israel Institute of Technology, current **GPA** 96/100. **Advisor**: Prof. Noy Cohen.
Research topic: Understanding and exploiting the swelling process of gels under constraints.

2015-2020 ***Bachelor of Science*** in Materials Science and Engineering and in Chemistry, Technion – Israel Institute of Technology, **GPA** 90/100. Graduation ***Cum Laude*** (*top 15%*).

PROFESSIONAL EXPERIENCE

2017-2019 **Research assistant at a student position**: The Macromolecular Materials Group of Prof. Michael S. Silverstein in the Department of Materials Science and Engineering, Technion.
Hands-on experience in High Internal Phase Emulsion (HIPE) **polymerization and characterization**, using SEM, DSC, DMTA, FTIR, and Instron mechanical testing.

RESEARCH INTERESTS

Frontal polymerization, fabrication and modeling. Modeling the mechanical behaviors of polymer networks using **continuum mechanics** and **statistical mechanics**; **3D-printing**; Mechanical characterization: tension and torsion experiments on **Instron**.

TEACHING EXPERIENCE The number in [] represents the student evaluation of teaching rank

(1) **Introduction to Mechanics of Soft Materials, new course designer** and **teaching assistant** (TA), undergraduate advanced course, Technion. [**4.97**/5]

(2) **Introduction to Solid Mechanics,** TA, third year undergraduate course, Technion. [**4.82**/5]

(3) **Mechanical Behavior of materials,** TA, third year undergraduate course*,* Technion. [**4.86**/5]

(4) **Fabrication Processes and Techniques of Materials,** TA, undergraduate advanced course, Technion. [**4.93**/5]

(5) **Research undergraduate students**: Ohad Cohen and Miriam Borshevsky. "Mechanical characterization of soft 3D-printed materials", Technion, 2020-2021

FELLOWSHIPS, AWARDS AND HONORS

2025-2027	**Outstanding Women Postdoctoral Scholars** Israeli PBC
2025-2027	**MIT-Kalaniyot Postdoctoral Fellows Program**
2021-2025	**Ariane de Rothschild** Women Doctoral Program
2024	**Outstanding Teaching Assistant**, Winter 23-24 semester
2024	**Outstanding Teaching Assistant**, Spring 22-23 semester
2023	**Outstanding Teaching Assistant**, Winter 22-23 semester
2023	**Outstanding Teaching Assistant**, Spring 21-22 semester
2022	**Outstanding Teaching Assistant**, Winter 21-22 semester
2022	**Outstanding Faculty Teaching Assistant**, Spring 20-21 semester
2021	Faculty **poster competition** winner
2020-2021	Leonard and Diane **Sherman** Interdisciplinary Graduate School Fellowship
2020	**KLA Tencor** prize for academic and research excellence
2020	B.Sc. ***Cum Laude*** honor
2015	**Schulich** award for high admission requirements

PUBLICATIONS

Refereed papers in professional journals

Published papers

(1) Yang, S.*, **Levin, M.***, Padmanabha, G. A., Borshevsky, M., Cohen, O., Seidel, T., Jones, R., Bouklas, N., Cohen, N., Physics Augmented Machine Learning Discovery of Composition-Dependent Constitutive Laws for 3D Printed Digital Materials, (2025) *International Journal of Engineering Science* (* Equal contributions). ***Journal Impact Factor (IF) 5.70, Q1*** DOI: https://doi.org/10.1016/j.ijengsci.2025.104381

(2) **Levin, M.**, Hanuhov, T., and Cohen, N., Autonomous lifting: swelling-activated 3D-printed actuators, (2025). *Sensors and Actuators: A. Physical* 116971. ***IF 4.90, Q1*** DOI: https://doi.org/10.1016/j.sna.2025.116971

(3) **Levin, M.**, and Cohen, N. (2025) Thermo-mechanics of PNIPAM gels: From a single chain to the network response, *Macromolecules 58.10,* 5187-5200. ***IF 5.10, Q1*** DOI: https://doi.org/10.1021/acs.macromol.4c03233

(4) Tang, Y., **Levin, M.**, Long, O., Eisenbach, C., Cohen, N., Valentine, M. (2025) Data-driven framework for the prediction of PEGDA hydrogel mechanics. *ACS Biomaterials Science & Engineering, 11 (1)*, 259–267. ***IF 5.79*** DOI: https://doi.org/10.1021/acsbiomaterials.4c01762

(5) **Levin, M.**, Tang, Y., Eisenbach, C., Valentine, M., Cohen, N. (2024) Understanding the response of Poly(ethylene glycol) diacrylate (PEGDA) hydrogel networks: a statistical mechanics-based framework. *Macromolecules, 57(15)*, 7074-7086. ***IF 5.10, Q1*** DOI: https://doi.org/10.1021/acs.macromol.3c02635

(6) **Levin, M.**, and Cohen, N. (2023) Swelling under constraints: Exploiting 3D-printing to optimize the performance of gel-based devices. *Advanced Materials Technologies* 2202136. **Cover article**. ***IF 6.98, Q1*** DOI: https://doi.org/10.1002/admt.202202136

(7) Israel, S., **Levin, M.**, Oliel, S., Mayer, D., Lerner, I., and Silverstein, M. S. (2022) Hierarchical porosity in emulsion-templated, porogen-containing interpenetrating polymer networks: hyper-cross-linking and carbonization. *Macromolecules, 55(6),* 1992-2002. ***IF 5.10, Q1*** DOI: https://doi.org/10.1021/acs.macromol.1c01432

(8) **Levin, M.**, Valentine, M. T., and Cohen, N. (2021) Tuning the response of fluid filled hydrogel core-shell structures. *Journal of the Mechanical Behavior of Biomedical Materials, 120,* 104605. *IF 3.46* DOI: https://doi.org/10.1016/j.jmbbm.2021.104605

(9) **Levin, M.**, and Cohen, N. (2021) The effects of aging on the mechanical properties of the vitreous. *Journal of Biomechanics, 119,* 110310. *IF 2.30* DOI: https://doi.org/10.1016/j.jbiomech.2021.110310

(10) Cohen, N., **Levin, M.**, and Eisenbach, C. D. (2021) On the origin of super contraction in spider silk. *Biomacromolecules, 22(2),* 993-1000. ***IF 6.58, Q1*** DOI: https://doi.org/10.1021/acs.biomac.0c01747

CONFERENCES

Oral Presentations

(1) The Thermo-Mechanics of PNIPAM Gels (sound bite), **New England Complex Fluids Workshop** (The 105^{th} NECF workshop), Harvard University, Cambridge, MA, USA, December 2025.

(2) The Mechanics of Gels: A Method to Measure Swelling Induced Stress, **European Solid Mechanics Conference** (ESMC2025), Lyon, France, July 2025.

(3) The mechanics of PEGDA hydrogels: From microstructure to macroscopic behavior, **Israel Materials Engineering Conference** (IMEC2025), Jerusalem, Israel, February 2025.

(4) Employing 3D-printing to measure swelling-induced stress in gels under mechanical constraints, **Israeli Vacuum Society** (IVS) Student Conference, Weizmann Institute of Science, Rehovot, Israel, September 2024.

(5) Gels under constraints: Measurement of swelling-induced stress, **Society of Engineering Science** (SES), Minneapolis, Minnesota, **USA**, October 2023.

(6) Measuring swelling induced stress of gels under constraints using 3D-printing, **Technion Chemical Engineering Student Conference** (TCESC), Technion, Haifa, Israel, August 2023.

(7) The influence of flexible mechanical constraints on the swelling of gels, **Israel Materials Engineering Conference** (IMEC2021), Jerusalem, Israel, December 2021.

(8) Investigating the forces generated by gels during the swelling process, **Additive Manufacturing Day** (AM-Blitz), Technion – Israel Institute of Technology, Haifa, Israel, May 2021.

<u>Poster presentations</u>

(1) Tuning the response of fluid filled hydrogel core-shell structures, **Israel Society for Theoretical and Applied Mechanics** (ISTAM), Technion, Haifa, Israel, December 2022, **Levin, M.**, Valentine, M. T., and Cohen, N.

(2) The influence of non-rigid mechanical constraints on the swelling of gels: experiments and modeling, **Jacobs Graduate Research Day**, January 2022, **Levin, M.** and Cohen N.

<u>COMMUNITY SERVICE AND SPECIAL ACTIVITIES</u>

(1) **Volunteer Mentor and Tutor** at Bat Ami, Academy for Life – Mentored and tutored young women and female undergraduates from at-risk backgrounds, 2022-2025.

(2) **Motivational and Educational Talks** – Led talks for high school students, undergraduates, and graduates on research in materials science as part of school educational tours and faculty open days at the Technion, 2021-2025.

(3) **Shared Life Project –** Led initiatives to promote coexistence on campus during challenging times, 2023.

(4) **Young Female Leaders in Science Workshop –** participated in a workshop for outstanding Ph.D. Technion students, 2023.

(5) **ProWoman Program** – participated in a program which inspires and promotes women in the academy and industry, Technion, 2021.