

# Noy Cohen

## Curriculum Vitae

De Jour, Room 609  
Department of Materials Science and Engineering  
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### Academic appointments

- 2019 - present **Assistant Professor**, *Department of Materials Science and Engineering, Technion, Haifa, Israel.*
- 2017 – 2019 **Postdoctoral Scholar**, *University of California, Santa Barbara, CA, USA.*  
Mentor: Robert McMeeking
- 2016 – 2017 **Postdoctoral Scholar**, *California Institute of Technology, Pasadena, CA, USA.*  
Mentor: Kaushik Bhattacharya
- 5/2015 **Visiting Scientist**, *Carnegie Mellon University, Pittsburgh, PA, USA.*  
Host: Kaushik Dayal
- 9/2013 **Visiting Scientist**, *Institute of Mechanics, TU Dortmund, Germany.*  
9/2014 – 2/2015 Host: Andreas Menzel  
Enabled due to the Minerva Fellowship for excelling researchers

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### Education

- 2012 – 2016 **Doctor of Philosophy**, *Department of Mechanical Engineering at the Ben-Gurion University, Beer-Sheva, Israel.*  
Title: *Multi-Scale Analysis of the Electro-Mechanical Response of Polymer Networks*  
Advisor: Gal deBotton
- 2010 – 2012 **Master of Science**, *Department of Mechanical Engineering at the Ben-Gurion University, Beer-Sheva, Israel.*  
Graduation **Cum Laude**  
Title: *On the electromechanical response of polymer chains at the microscopic level*  
Advisor: Gal deBotton
- 2007 – 2011 **Bachelor of Science**, *Department of Mechanical Engineering at the Ben-Gurion University, Beer-Sheva, Israel.*  
Graduation **Magna Cum Laude**

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### Publications

- S. Wehmeyer, F.W. Zok, C. Eberl, P. Gumbsch, **N. Cohen**, R.M. McMeeking, and M.R. Begley, “Post-buckling and dynamic response of angled struts in elastic lattices”. *J. Mech. Phys. Solids*, 133: 103693, 2019. [link]
- **N. Cohen** and C.D. Eisenbach, “A microscopically motivated model for the swelling-induced drastic softening of hydrogen-bond dominated biopolymer networks”. *Acta Biomaterialia*, 96: 303-309, 2019. [link]
- **N. Cohen**, J.H. Waite, R.M. McMeeking, and M.T. Valentine, “Force distribution and multiscale mechanics in the mussel byssus”. *Phil. Trans. R. Soc. B*, 374: 20190202, 2019. [link]
- **N. Cohen**, “Programming the equilibrium swelling response of heterogeneous polymeric gels”. *Int. J. Solids Struct.*, 178-179: 81-90, 2019. [link]

- **N. Cohen**, V.S. Deshpande, J.W. Holmes, and R.M. McMeeking, “A microscopically-motivated model for the remodeling of cardiomyocytes.” *Biomech. and Modeling in Mechanobiology*, 18: 1233-1245, 2019. [link]
- **N. Cohen** and R.M. McMeeking, “On the swelling induced microstructural evolution of polymer networks in gels.” *J. Mech. Phys. Solids*, 125: 666-680, 2019. [link]
- **N. Cohen**, R.M. McMeeking, and M.R. Begley, “Modeling the non-linear elastic response of periodic lattice materials.” *Mech. of Mat.*, 129: 159-168, 2019. [link]
- **N. Cohen** and K. Bhattacharya, “A numerical study of the electromechanical response of liquid metal embedded elastomers.” *Int. J. Non-Linear Mech.*, 108: 82-86, 2019. [link]
- **N. Cohen**, O. A. Saleh, and R. M. McMeeking, “Engineering the mechanical behavior of polymer networks with flexible self-assembled V-shaped monomers.” *Macromolecules*, 51 (8): 3149–3155, 2018. [link]
- **N. Cohen**, “A generalized electro-elastic theory of polymer networks.” *J. Mech. Phys. Solids*, 110: 173-191, 2018. [link]
- **N. Cohen** and K. Bhattacharya, “Electroclinic effect in chiral smectic-A liquid crystal elastomers.” *Phys. Rev. E*, 96: 032701, 2017. [link]
- **N. Cohen**, S. S. Oren and G. deBotton, “The evolution of the dielectric constant in various polymers subjected to uniaxial stretch.” *Extreme Mech. Lett.*, 16: 1-5, 2017. [link]
- **N. Cohen**, “Enhancing the electromechanical response of stacked dielectric actuators”. *J. Elasticity*, 127: 103-113, 2017. [link]
- **N. Cohen**, “Stacked dielectric tubes with electromechanically controlled radii.” *Int. J. Solids Struct*, 108: 40-48, 2017. [link]
- **N. Cohen** and G. deBotton, “The electromechanical interplay in deformable dielectric elastomer networks.” *Phys. Rev. Lett.*, 116: 208303, 2016. [link]
- **N. Cohen**, K. Dayal and G. deBotton, “Electroelasticity of polymer networks”. *J. Mech. Phys. Solids*, 92: 105-126, 2016. [link]
- **N. Cohen**, A. Menzel and G. deBotton, “Towards a physics-based multiscale modelling of the electro-mechanical coupling in electro-active polymers.” *Proc. R. Soc. A*, 472: 20150462, 2016. [link]
- **N. Cohen** and G. deBotton, “The electromechanical response of polymer networks with long-chain molecules”. *Math. Mech. Solids*, 721: 728–20(6), 2015 (an invited paper to the special issue in honor of Ray Ogden’s 70th birthday). [link]
- **N. Cohen** and G. deBotton, “Multiscale analysis of the electromechanical response of dielectric elastomers”. *Eur. J. Mech. A-Solids*, 48: 59–48, 2014. [link]

### In preparation

- A.H. Khankhel, B. Kaytanli, **N. Cohen**, and M.T. Valentine, “Spectral analysis approach to measuring 3D cell-generated tractions with microsphere-based traction force microscopy”. Submitted for publication.

### Theses

- Ph.D., *Multi-Scale Analysis of the Electro-Mechanical Response of Polymer Networks*  
Mechanical Engineering Department, Ben-Gurion University, 2016.  
Advisor: Prof. Gal deBotton
- M.Sc., *On the electromechanical response of polymer chains at the microscopic level*  
Mechanical Engineering Department, Ben-Gurion University, 2012.  
Advisor: Prof. Gal deBotton

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## Presentations

If the speaker is not N. Cohen, he/she are underlined

## Conferences

- **N. Cohen** and Claus D. Eisenbach, 2019: *On the swelling-induced drastic softening of hydrogen-bond dominated biopolymer networks*. 8th International Conference on Mechanics of Biomaterials and Tissues, Waikoloa Beach, HI, USA.
- L. Gockowski, E. Hawkes, M. T. Valentine, and **N. Cohen**, 2019: *Programmable stiffness in 3D-printable systems*. 56th Annual Technical Meeting of the Society of Engineering Science (SES19), Washington University in St. Louis, MO, USA.
- **N. Cohen** and Claus D. Eisenbach, 2019: *Drastic swelling-induced softening of biopolymer networks*. 56th Annual Technical Meeting of the Society of Engineering Science (SES19), Washington University in St. Louis, MO, USA.
- **N. Cohen**, 2019: *Drastic swelling-induced softening of hydrogen-bond dominated biopolymer networks*. New Trends in Solid Mechanics: Coupled Fields and Multi-scale Modelling, Castro-Urdiales, Cantabria, Spain.
- **N. Cohen**, 2019: *Programming the non-linear response of periodic elastic lattice structures*. Additive Manufacturing Day, Technion, Israel.
- **N. Cohen**, 2018: *Soft tubes with electromechanically controlled radii*. Winter Study Group, University of California, Santa Barbara, U.S.A.
- G. deBotton and **N. Cohen**, 2017: *Multiscale analysis of the electromechanical coupling in dielectric elastomers*. Modelling of Nonlinear Continua, Castro-Urdiales, Spain.
- **N. Cohen**, A. Menzel and G. deBotton, 2015: *Modelling of the Electro-Mechanical Response of EAPs*, Israel Society for Theoretical and Applied Mechanics (ISTAM), Tel-Aviv University, Israel.
- G. deBotton and **N. Cohen**, 2015: *Microstructural Motivated Analysis of the Electromechanical Coupling in Dielectric Elastomers*, 52nd Annual Technical Meeting of the Society of Engineering Science (SES15), Texas A&M University, Texas, U.S.A.
- **N. Cohen**, A. Menzel and G. deBotton, 2015: *Towards physics-based modeling of the electro-mechanical response of EAPs*, 9th European Solid Mechanics Conference (ESMC), Madrid, Spain.
- **N. Cohen**, A. Menzel and G. deBotton, 2015: *A comparison between different coupled models for the electro-mechanical response of EAPs*, PACAM XV, Champaign, Illinois, U.S.A.
- G. deBotton and **N. Cohen**, 2015: *Molecular to continuum analysis of the coupling between mechanics and electrostatics in polymer chain networks*, SPIE - Electroactive Polymer Actuators and Devices (EAPAD) XVII, San Diego, California, U.S.A.
- **N. Cohen** and G. deBotton, 2014: *Multiscale analysis of the electromechanical coupling in polymer networks*, 14th European Mechanics of Materials Conference (EMMC-14), Gothenburg, Sweden.
- **N. Cohen** and G. deBotton, 2014: *A multi-scale analysis of the electro-mechanical response of polymer networks with long-chain molecules*, EuroEAP, Linköping, Sweden.
- **N. Cohen** and G. deBotton, 2014: *The coupling between electrostatics and mechanics in polymer networks*, IUTAM Symposium on Mechanics of Soft Active Materials (IUTAM 2014), Technion, Haifa, Israel.
- **N. Cohen** and G. deBotton, 2013: *Electromechanical response of polymer networks with long-chain molecules*, 50th Annual Technical Conference of the Society of Engineering Sciences and ASME-AMD Annual Summer Meeting (SES13), Brown University, Providence, Rhode Island, U.S.A.
- **N. Cohen** and G. deBotton, 2013: *On the coupled response of EAP chains*, New Trends in Solid Mechanics: Coupled Fields and Multi-scale Modelling, Castro-Urdiales, Cantabria, Spain.

- **N. Cohen** and **G. deBotton**, 2013: *The electromechanical response of polymer chains at the microscopic level*, Euromech Colloquium 545 Frontiers in Finite-Deformation Electromechanics, TU Dortmund, Germany.
- **N. Cohen** and **G. deBotton**, 2012: *On the coupled response of electro-active polymer chains*, 49th Annual Technical Conference of the Society of Engineering Sciences (SES12), Georgia Tech., Atlanta, U.S.A.
- **N. Cohen** and **G. deBotton**, 2011: *On the electro-mechanical response of polymer chains at the microscopic level*, 48th Annual Technical Conference of the Society of Engineering Sciences (SES11), Northwestern University Evanston, Illinois, U.S.A.
- Attended the summer school on “Modeling in Biomechanics and Mechanobiology at Different Length Scales” coordinated by G.A. Holzapfel and R.W. Ogden, Graz University of Technology, Austria (2010)

### Conference proceedings

- **N. Cohen** and **G. deBotton**, 2014: *A multi-scale analysis of the electro-mechanical response of polymer networks with long-chain molecules*, EuroEAP conference proceedings, Linköping, Sweden.

### Talks

- **N. Cohen**, 2017: *Enhancing the performance of dielectric elastomers through microstructural design*, Department of Mechanical Engineering, University of California, Santa Barbara, CA, USA.
- **N. Cohen** and **K. Bhattacharya**, 2017: *A numerical study of the electro-mechanical response of liquid metal embedded elastomers*, Department of Mechanical and Civil Engineering, California Institute of Technology, Pasadena, CA, USA.
- **N. Cohen**, **K. Dayal** and **G. deBotton**, 2016: *Electroelasticity of polymer chain networks*, Department of Mechanical and Civil Engineering, California Institute of Technology, Pasadena, CA, USA.
- **N. Cohen**, **K. Dayal** and **G. deBotton**, 2016: *On the electro-mechanical response of polymer chain networks*, Department of Mechanical Engineering, Technion, Israel.
- **N. Cohen**, **K. Dayal** and **G. deBotton**, 2016: *A statistical analysis of the electro-mechanical response of polymers*, Department of Mechanical Engineering, Tel-Aviv University, Israel.
- **N. Cohen**, **K. Dayal** and **G. deBotton**, 2015: *Electroelasticity of polymer networks*, Department of Mechanical Engineering, Ben-Gurion University, Israel.
- **N. Cohen**, **A. Menzel** and **G. deBotton**, 2015: *Coupled constitutive models for the behavior of EAPs*, Department of Mechanical Engineering, TU Dortmund, Germany.
- **N. Cohen** and **G. deBotton**, 2013: *Multiscale analysis of the electromechanical response of dielectric elastomers*, Department of Mechanical Engineering, TU Dortmund, Germany.
- **N. Cohen** and **G. deBotton**, 2012: *On the coupled response of EAP chains*, Department of Mechanical Engineering, Ben-Gurion University, Israel.

### Invited talks and lectures

- **N. Cohen**, 2019: *On the microstructural mechanisms that govern swelling*, Department of Coatings and Polymeric Materials, North Dakota State University, ND, USA.
- **N. Cohen**, 2019: *Programming the response of electro-active polymers through microstructural design*, Electro-Rheological Fluids Meeting, Tel-Aviv University.
- **N. Cohen**, 2019: *Controlling the swelling response of polymer networks*, Faculty of Engineering, University of Nottingham, UK.

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## Professional activities

Organizer and session chair Mechanics and physics of soft materials, 56th Annual Technical Meeting of the Society of Engineering Science (SES19), Washington University in St. Louis, MO, USA, 2019.

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## Research Students

### Graduate students and post-docs

Roni Sverdlov Arzi “An experimental and theoretical insight into the interaction between nanoparticles and mucosal tissues”, Ph.D. Student, Technion, 2019 - present.

### Undergraduate students

Somayajulu Dhulipala “A bi-stable mechanism based on shape memory alloys”, SURF Program, California Institute of Technology, 2017.

Shai Shalom Oren “The characterization of the electrical properties of polymers under large deformations”, Ben-Gurion University, 2015.

Elior Masud “The Effects of Different Parameters on the Behavior of EAPs”, Ben-Gurion University, 2013.

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## Awards and scholarships

- Otis Williams Postdoctoral Fellowship in Bioengineering at UCSB (2018)  
Proposal title: “The mechanisms of remodeling in cardiomyocytes”.
- The Minerva Fellowship for excelling researchers (2014)
- Financial support from COST (European Cooperation in Science and Technology) in the framework of ESNAM (European Scientific Network for Artificial Muscles) for the EuroEAP 2014 conference in Linköping, Sweden
- The “Ehud Ben-Amity” award for leading graduate students whose research is related to aerospace engineering (one of two of Ben-Gurion University winners for the year 2013)
- The Negev scholarship: “The Paran fellowship” for outstanding PhD students (2012-2016)
- Excellency for the B.Sc. degree (2011)
- The Chairperson Excellence Prize for the third year of the B.Sc. degree (2010)
- The Chairperson Excellence Prize for the second year of the B.Sc. degree (2009)
- The Intel Award for Excelling Science Students (2008)

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## Membership in professional societies

- SES - Society of Engineering Science
- ISTAM - Israel Society for Theoretical and Applied Mechanics
- ESNAM - European Scientific Network for Artificial Muscles

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## Teaching experience

The value in [ ] corresponds to the average TA evaluation by students on a scale of 1-5.

Course Lecturer **Multi-scale Mechanics of Soft Polymers**, *graduate course*, Technion.

Course Lecturer **Introduction to Solid Mechanics**, *Second/third year undergraduate course*, Technion.

Course Lecturer **MATLAB**, *Second year undergraduate course*, Ben-Gurion University.

Teaching Assistant **Strength of Materials**, *Second year undergraduate course*, Ben-Gurion University, [4.7/5].

Teaching Assistant **Introduction to Mechanical Engineering**, *First year undergraduate lab*, Ben-Gurion University, [4.7/5].

Teaching Assistant **Mechanical Engineering Labs**, *Third year undergraduate lab*, Ben-Gurion University, [4.7/5].

Teaching Assistant **Differential Equations**, *Second year undergraduate course*, Ben-Gurion University, Eilat campus.

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### Journal referee

Journal of the Mechanics and Physics of Solids; Materials Science and Engineering B;  
International Journal of Solids and Structures; Mechanics of Soft Materials

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### Languages

English, Spanish, Hebrew