

## CURRICULUM VITAE

### DORON SHILO

#### PERSONAL:

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Web: <https://shilo.net.technion.ac.il/>

#### ACADEMIC DEGREES:

- 2003 Ph. D., Materials Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 1999 M. Sc., Materials Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 1996 B. Sc., *Summa Cum Laude*, Materials Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 1996 B. Sc., *Summa Cum Laude*, Physics, Technion – Israel Institute of Technology, Haifa, Israel.

#### ACADEMIC APPOINTMENTS:

- 2017 - Professor, Faculty of Mechanical Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2010 - 2017 Associate Professor, Faculty of Mechanical Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2004 - 2010 Senior Lecturer, Faculty of Mechanical Engineering, Technion – Israel Institute of Technology, Haifa, Israel.
- 2003-2004 Postdoctoral Researcher, Graduate Aeronautical Laboratories, Caltech – California Institute of Technology, USA.

#### PROFESSIONAL EXPERIENCE:

06-09/2013 Visiting Academic scientist, General Motors R&D Center, Warren, MI, USA.

#### RESEARCH INTERESTS:

- Mechanics of active materials
- Mechanics of material interfaces
- Mechanics of materials at small scales
- Mechanics of biogenic materials
- Mechanical-biomolecular interactions

## **TEACHING EXPERIENCE:**

### **At Technion:**

#### *Graduate courses lecturer:*

2005- 036065 - Electro and Magneto Mechanics for Actuation and Sensing  
(a newly developed course).

#### *Undergraduate courses lecturer:*

2005: 035027 - Experimental methods  
2006-2011: 034028 - Solid Mechanics 1  
2007-2008: 035041 - Mechanics of Microsystems  
2011- 034044 - Introduction to Experimental Methods  
(developed a new syllabus)

### **Caltech:**

10/2003–02/2004: Substitute Lecturer, California Institute of Technology. Mechanics of Structures and Solids, for graduate students.

## **FACULTY ACTIVITIES:**

2016-2020: Member, Undergraduate Studies Committee  
2014-2015: Head, Material Mechanics and MEMS Program, Faculty of Mechanical Engineering, Technion  
2013-2014: Head, Laboratories Committee, Faculty of Mechanical Engineering, Technion  
2012-2013: Head, Optical Engineering Program, Faculty of Mechanical Engineering, Technion  
2011-2013: Deputy Dean for Undergraduate Studies, Faculty of Mechanical Engineering, Technion  
2010-2013: Member, Graduate Studies Committee  
2006-2007: Head, Materials Mechanics Center (09/2006-09/2007)  
2006-2010: Member, Danziger Laboratories Committee  
2006 - : Faculty representative at the Department of Materials Engineering  
2005 - : Head and founder of the Laboratory for Nano and Micro Mechanics of Materials

## **TECHNION ACTIVITIES:**

2020- Vice Dean for Undergraduate Studies  
2016-2019 Member, Academic Studies Committee (VAADAT HAKEVA).  
2015-2020 Head, Mechanical Engineering Program at the International School of the Technion.

2007-2011 : Member, Multidisciplinary Program of Nano-Science and Nano-Technology

**PUBLIC PROFESSIONAL ACTIVITIES:**

- 2018 - Member of the International Advisory Board for the Institute of Thermomechanics, Czech Republic Academy of Science.
- 2018 - Science Advisor (member of a panel that select grants) to the U.S.-Israel Binational Science Foundation (BSF).
- 2009 - 2015 Associate Editor, Experimental Mechanics (IF 2.09).
- 2008 - Member of the Board of Review (Key Reader), Metallurgical and Materials Transactions A.

**SPECIAL PROFESSIONAL ACTIVITIES:**

**Reviewer for research grant proposals:**

Czech Science Foundation, Technion Gurwin Foundation, Israel Science Foundation, Pazi Foundation, ERC Advanced.

**Journal refereeing:**

J. Mech. Phys. Solids, Phys. Rev. B., Phys. Rev. Lett., Experimental mechanics, Sensors and Actuators A, Nanotechnology, Journal of Materials Science, Colloids and Surfaces A, Material Mechanics, Materials Science and Technology, Smart Materials and Structures, American Mineralogist, Apl. Materials.

**MEMBERSHIP IN PROFESSIONAL SOCIETIES:**

SEM - Society of Experimental Mechanics  
SES – Society of Engineering Science  
ISTAM – Israel Society for Theoretical and Applied Mechanics

**HONORS:**

- 2016 Henry Taub Prize for Academic Excellence
- 2015 Ray and Miriam Klein Research Prize
- 2004 Lady Davis Fellowship (07/2004 – 08/2004)
- 2003 Lester Deutsch Fellowship for postdoctoral scholars at Caltech
- 2003 Certificate for exceptional Ph.D. dissertation, Technion – Israel Institute of Technology
- 2002 Shenkar Family Prize for Ph. D. studies
- 2002 Miriam and Aaron Gutwirth Memorial Fellowship as a Summa Cum Laude award in Materials Engineering

- 2001 Maayan and Dr. Avishay Katz Prize for excellent research in Materials Engineering
- 2000-2002 Four Technion fellowships for distinction during Ph.D. studies
- 1996 Shenkar Family Prize for Best Project in Materials Engineering
- 1992-1996 President's Honor Student List for undergraduate students, each semester

## GRADUATE STUDENTS \*1:

### M. Sc. Students:

#### *Completed Theses [16]:*

1. Eran Ben-David 2005-2008, "A new instrument for tensile testing of thin free-standing films at high strain rates" [J29; C15]♦, primary advisor (Profs. D. Rittel and D. Elata co-advisors). Currently: PhD student in my research group and Head of an R&D group in RAFAEL.
2. Yossi Abu 2005-2008, "Micro mechanics of domain switching in ferroelectric materials".
3. Shahaf Vollach 2005-2008, "The mechanical response of shape memory alloys under a rapid heating pulse", [J32; C4, C36, C38]. Award: Barazani Prize for Excellence, 2009. Currently: PhD student in my research group and Head of an R&D group in RAFAEL.
4. Oren Kanner 2008-2010, "Ferromagnetic shape memory alloy actuators", [J40]. Awards: Lady Davis Fellowship (2008-2009), Gutwirth Memorial Fellowship for Excellence (2009-2010). Currently: PhD student in Yale, USA.
5. Yarden Weber 2006-2011, "Real-time health and stress monitoring of composite materials using magnetostrictive fillers", [C14, C16, C17]. Award: Israel representative in the SAMPE-Europe Student Seminar contest. Currently: Research Fellow in RAFAEL
6. Alex Yoffe 2011-2014, "Modeling the magneto-mechanical response of magnetostrictive composite materials", [J49, C46], *Transferred to a direct PhD program*.
7. Noam Zerihan 2013-2015, "Twin boundary motion in ferroic materials", [J47; C47], *Transferred to a direct PhD program*.
8. Yulia Marom 2014-2016, "Characterization of Bio-Mechanical Processes Occurring in the Placenta under Mechanical Stress", [J53; C49]. Award: Jacobs Fellowship for Excellence, 2016. *Transferred to a direct PhD program*.
9. Nehara Adelsberg 2014-2016, "Wireless Thin Layer Force Sensors Based on Magnetostrictive Composite Material", [J61]. Currently: R&D Engineer in RAFAEL.

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\* As a single primary supervisor, unless written differently

♦ J## denotes Journal publication number ##. C## denotes Conference presentation number ##.

10. Yoav Malka 2014-2016, "A fast and powerful release mechanism based on pulse heating of shape memory wires", [J62]. Award: Gemunder Prize for Space-Defense Related Technologies, 2016. Currently: Head of a R&D group in RAFAEL.
11. Dekkel Avraham 2015-2017 (Brakim program – a special BSc + MSc program for distinguished students), "Development of a miniature, battery-less, self-propagating device based on shape memory alloys", [J67].
12. Uria Heller 2014-2018, "Development of load-control mechanical pulser based on shape memory wires", [J73].
13. Emil Bronstein 2016-2018, "Dynamics of twinning transformation in Cu-Al-Ni", [C50, C57 ; J70, J72].
14. Bar Danino 2016-2018 (Brakim program), "Atomistic calculation of twin wall properties and dynamics based on an atomistic Landau-Ginzburg potential", Co-advisor (with Assoc. Professor Dan Mordehai as Primary advisor), [J75].
15. Gil Gur-Arie 2017-2019 (Brakim program), "Atomistic calculation of relations between material properties and twin wall dynamics", Co-advisor (with Assoc. Professor Dan Mordehai as Primary advisor), [J75].
16. Asaf Mizrahi 2018-2020, "Twin boundary structure and mobility in shape memory alloys", [J73, J77].

*Theses in Progress [2]:*

17. Yeshurun Cohen (Since September 2018), "A novel method for 3D printing of shape memory alloys".
18. Arnon Rosenberg (Since April 2019), "A MEMS Tamper Protection Device based on Shape Memory Alloy Technology".

**Ph.D. students:**

*Completed Theses [8]:*

1. Yaniv Ganor 2004-2008, "Magneto-mechanical characteristics of ferromagnetic shape memory alloys", [J20, J24, J27, J28, J30 ; C10, C11, C13, C30, C31, C34, C35, C37, C39, C41]. Awards: (1) Jacobs Foundation Prize for Excellence, 2007; (2) Barazani Prize for Excellence, 2009. 2009-2011: Post-doctoral fellow at the University of Minnesota, under the supervision of Prof. R. D. James. Currently: R&D engineer in the USA.
2. Haika Drezner 2006-2011, "Nanoscale modulus mapping: implementation on material interfaces and biogenic materials", [J26, J34; C2, C5, C12, C32, C40, C44].
3. Eilon Faran 2008-2012, "Dynamics of twinning processes in active materials", [J33, J36, J37, J38, J39; C6, C8, C18, C42, C43]. Awards: Departmental Excellence Fellowship (2009-2010), Gutwirth Memorial Fellowship for Excellence (2009-2010), Departmental

Excellence Fellowship (2010-2011), Jacobs Prize for Excellent Publication (awarded for the best three student publications in the Technion in 2011). Currently: Research fellow in my research group.

4. Eran Ben-David 2010-2015, "Investigation of the Mechanical Response and Characteristics of Thin Free-standing Films at Various Strain Rates", [J43, J44, J45, J54], Primary advisor (Prof. D. Rittel, co-advisors). Currently: Head of an R&D group in RAFAEL.
5. Meni Kabla 2009-2015, "Fabrication, characterization, and application of actuators based on thin shape memory alloy films", [J42, J46, J51, J54, J57, J59, C19]. Currently: Head of an R&D group in RAFAEL.
6. Alex Yoffe 2014-2017, "Magnetostrictive composites for wireless stress sensing applications", [J49, J60, J61, J64; C46]. Currently: System Engineer in KLA.
7. Shahaf Vollach 2010-2017, "The mechanical response of shape memory alloys under a rapid heating pulse", [J55, J58, J63; C7, C9]. Currently: Research Fellow in RAFAEL.
8. Noam Zerihan 2015-2018, "Barriers, mechanisms of motion, and kinetic laws for twin wall dynamics in ferroic materials", [J47, J66, J68, J71, J74; C11, C47]. Award: Departmental Excellence Fellowship, RBNI Fellowship (2018). Currently: Engineer in RAFAEL.
9. Yulia Marom 2016-2020, "Characterization of Bio-Mechanical Processes Occurring in the Placenta under Mechanical Stress", [J53, J79, J80; C49, C53]. Award: Jacobs Fellowship for excellence (2016). Currently: Research Fellow in the Single Molecule Biophysics and Bio-Nano Technology Lab, Technion.

*Theses in Progress [2]:*

10. Asaf Dana (Since October 2018), "Motion of phase boundaries in shape memory alloys: Mechanisms of motion, evolution of microstructure and kinetic relations", [J78, J81, J82; C12], Awards: Daniel Fellowship for Excellence (2019-2020), Jacobs Fellowship for Excellence (2020-2021), Departmental Excellence Fellowship (2020-2021).
11. Emil Bronstein (Since February 2020), "Novel methods for measurement and data-driven analysis of acoustic and magnetic emissions", Primary advisor (Prof. Ronen Talmon, co-advisors), [J83; C59], Awards: Daniel Memorial Fellowship for Excellence (2020-2021). Azrieli Fellowship (2021-2023).

**Post-Doctoral and Research Fellows:**

1. Dr. Yaniv Ganor, September 2008 – March 2009, [J40], MAFAT-MOD grant.
2. Dr. Eilon Faran, July 2012 – , [J39, J47, J48, J52, J56, J65, J66, J68, J70, J71, J72, J73, J74, J76, J77, J78, J81, J84, J85, J86, J87 ; C10, C11, C12, C42, C43, C45, C47, C48,

C50, C51, C52, C56, C57, C58, C59], ISF grants 1341/10 and 1268/14, NSF-BSF grant 2017-2020, ISF grant 1309/18.

3. Dr. Yossi Ezer, 10-12/2013, MAFAT-MOD grant.

### RESEARCH GRANTS\*:

**Total funding: \$2.79M in research grants plus \$330k in equipment grants**

- 2019-2020 Israel Defense Ministry - MAFAT, \$30k, *3D printing of Nitinol*.
- 2019-2020 Technion Foundation for Defense Research, \$27k, *A MEMS Tamper Protection Device based on Shape Memory Alloy Technology*.
- 2018-2019 Israel Defense Ministry - MAFAT, \$55k, *3D printing of Nitinol*.
- 2018-2022 **Israel Science Foundation**, \$340k, *Motion of phase boundaries in shape memory alloys: Mechanisms of motion, evolution of microstructure and kinetic relations*.
- 2018-2022 **Israel Science Foundation**, \$275k, *Stretch-induced biomechanical changes in fetal membranes*, as a collaborator with Prof. Eliezer Shalev as PI.
- 2018-2020 Technion-GTIIT Collaboration Foundation, \$25k, *How fast is the martensitic transformation in shape memory alloys?*, with Prof. Klaus-Dieter Liss from GTIIT as co-PI.
- 2017-2020 **United States – Israel Binational Science Foundation (NSF-BSF program)**, \$195k, *Twin boundary structure and mobility in shape memory alloys*. With Prof. Peter Mullner from Boise State University as co-PI.
- 2016-2017 Technion Foundation for Defense Research, \$18k, *Release mechanism for missile steering systems by means of a novel actuator based on shape memory wires subjected to high strain rates*.
- 2015-2016 Technion Foundation for Defense Research, \$35k, *Release mechanism for missile steering systems by means of a novel actuator based on shape memory wires subjected to high strain rates*.
- 2015-2016 Israel Defense Ministry - MAFAT, \$65k, *Advanced Micro Actuators*.
- 2014-2018 **Israel Science Foundation**, \$305k, *Barriers, mechanisms of motion, and kinetic laws for twin boundary dynamics in ferroic materials*.
- 2014-2015 Israel Defense Ministry - MAFAT, \$65k, *Advanced Micro Actuators*.

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\* As a single PI, unless written differently

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- 2013-2016 PAZY Foundation, \$150k, in collaboration with RAFAEL, *Thin Layer Force Sensors Based on Magnetostrictive Composite Material*.
- 2013-2014 Israel Defense Ministry - MAFAT, \$52k, *Advanced Micro Actuators*.
- 2012-2012 RAFAEL, \$26k, *Structural Health Monitoring Based on Magnetostrictive Materials*.
- 2012-2013 Israel Defense Ministry - MAFAT, \$52k, *Advanced Micro Actuators*.
- 2012-2013 Israel Defense Ministry - MAFAT, \$40k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel as CIs.
- 2012 Israel Defense Ministry - MAFAT, \$93k, *Purchase grant for Advanced Control Unit for Hysitron TriboIndenter*.
- 2011-2012 Israel Defense Ministry - MAFAT, \$43k, *Advanced Micro Actuators*.
- 2011-2012 Israel Defense Ministry - MAFAT, \$43k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel as CIs.
- 2010-2014 **Israel Science Foundation**, \$225k, *Multiscale Dynamics of Twinning Transformation in Ferroelastic and Ferroelectric Materials*.
- 2010-2013 General Motors, \$245k, *High strain-rate electrical actuation of shape memory alloy wires*.
- 2010-2011 Israel Defense Ministry - MAFAT, \$43k, *Advanced Micro Actuators*.
- 2010-2011 Israel Defense Ministry - MAFAT, \$43k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel as CIs.
- 2009-2010 Israel Defense Ministry - MAFAT, \$43k, *Advanced Micro Actuators*.
- 2009-2010 Israel Defense Ministry - MAFAT, \$43k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel as CIs.
- 2008-2009 Israel Defense Ministry - MAFAT, \$43k, *Advanced Micro Actuators*.
- 2008-2009 Israel Defense Ministry - MAFAT, \$56k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel and Dr. D. Elata as CIs.
- 2008-2009 Russel Berrie Nanotechnology Institute – NEVET program, \$40k, *Nanostructure and local mechanical characteristics of natural bio-composites*, with Prof. Emil Zolotoyabko as co-PI.
- 2007-2008 Israel Defense Ministry - MAFAT, \$36k, *Advanced Micro Actuators*.
- 2007-2008 Israel Defense Ministry - MAFAT, \$44k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel and Dr. D. Elata as CIs.



- 2007-2008 Israel Defense Ministry - MAFAT, \$24k, *Advanced Micro Actuators*.
- 2006 Israel Defense Ministry - MAFAT, \$44k, *Nanoscale Mechanics of Materials*, PI, with Prof. D. Rittel and Dr. D. Elata as CIs.
- 2005-2008 **Israel Science Foundation**, \$132k, *Mechanics and Kinetics of Domain Switching in Ferroelectric Materials*.
- 2005 **Israel Science Foundation**, \$195k, *Equipment grant for the Laboratory for Micro and Nano Mechanics of Materials*.
- 2005-2007 Israel Defense Ministry - MAFAT, \$66k, *Advanced Micro Actuators*.
- 2005 Israel Defense Ministry - MAFAT, \$150k, *Purchase grant for High speed Imaging System*, with Prof. D. Rittel and Dr. D. Elata.
- 2005 Israel Defense Ministry - MAFAT, \$41k, *Purchase grant for High Magnetic Field Pulser*.
- 2004 Israel Defense Ministry - MAFAT, \$44k, *Advanced Micro Actuators*.

## **PUBLICATIONS:**

### **Theses:**

M. Sc. Thesis Topic:

*Strain Analysis in Near Surface Crystalline Layers*, Technion (1999), Advisor: Prof. Emil Zolotoyabko.

Ph. D. Thesis Topic:

*Interaction of dynamic deformation fronts induced by intrinsic dislocations in single crystals*, Technion (2003), Advisor: Prof. Emil Zolotoyabko.

### **Refereed papers in professional journals:**

#### **Published papers:**

1. N. Mainzer, **D. Shilo**, E. Zolotoyabko, G. Bahir, A. Sher, "Characterization of CdTe/Hg<sub>1-x</sub>Cd<sub>x</sub>Te heterostructures by high-resolution x-ray diffraction, *J. Electron. Mater.* **26**, 606-609 (1997).
2. N. Mainzer, **D. Shilo**, E. Zolotoyabko, G. Bahir, A. Sher, K. Cytermann, R. Brener, "Measurement of depth dependant atomic concentration profiles in CdTe/Hg<sub>1-x</sub>Cd<sub>x</sub>Te structures", *J. Appl. Phys* **82**, 2869-2276 (1997).
3. E. Zolotoyabko, **D. Shilo**, "Control of static strains in crystals by dynamic pressure of phonon flow", *Ultrasonics* **36**, 403-408 (1998).

4. E. Zolotoyabko, **D. Shilo**, W. Sauer, E. Pernot, and J. Baruchel, "Visualization of 10  $\mu\text{m}$  surface acoustic waves by stroboscopic x-ray topography", *Appl. Phys. Lett.* **73**, 2278-2280 (1998).
5. E. Zolotoyabko, **D. Shilo**, W. Sauer, E. Pernot, and J. Baruchel, "Stroboscopic x-ray topography in crystals under 10- $\mu\text{m}$  surface acoustic wave excitation", *Rev. Sci. Instrum.* **70**, 3341-3345 (1999).
6. E. Zolotoyabko, **D. Shilo**, W. Sauer, E. Pernot, and J. Baruchel, "Stroboscopic diffraction imaging of high-frequency surface acoustic waves", *ESRF Newsletter* **32**, 20 (1999).
7. Y. Avrahami, **D. Shilo**, N. Mainzer, E. Zolotoyabko, "Study of atomic diffusion in crystalline structures by high-resolution x-ray diffraction", *J. Cryst. Growth* **198/199**, 264-269 (1999).
8. Y. Roichman, A. Berner, R. Brener, C. Cytermann, **D. Shilo**, E. Zolotoyabko, M. Eizenberg, & J. Osten, "Co silicide formation on epitaxial  $\text{Si}_{1-y}\text{C}_y/\text{Si}(001)$  layers", *J. Appl. Phys.* **87**, 3306-3312 (2000).
9. E. Berkowicz, D. Gershoni, G. Bahir, E. Lakin, **D. Shilo**, E. Zolotoyabko, A. C. Abare, S. P. Denbaars, & L. A. Coldren, "Measured and calculated radiative lifetime and optical absorption of  $\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$  quantum structures", *Phys. Rev. B* **61**, 10994-11008 (2000).
10. E. Zolotoyabko, **D. Shilo**, and E. Lakin "X-ray imaging of acoustic wave interaction with dislocations", *Mater. Sci. & Eng.* **A309/310**, 23-27 (2001).
11. **D. Shilo**, E. Lakin, and E. Zolotoyabko, " Comprehensive strain analysis in thin films, based on high-resolution x-ray diffraction: application to implanted  $\text{LiNbO}_3$ ", *Phys. Rev B* **63**, 205420 (2001).
12. **D. Shilo**, E. Lakin, and E. Zolotoyabko, "Measurement of subtle strain modifications in heterostructures by using x-ray mapping in reciprocal space", *J. Appl. Crystl* **34**, 715-721 (2001).
13. **D. Shilo** and E. Zolotoyabko, "Visualization of surface acoustic wave scattering by dislocations", *Ultrasonics* **40**, 921-925 (2002).
14. **D. Shilo**, E. Lakin, E. Zolotoyabko, J. Hartwig, and J. Baruchel, "Visualization of acoustic wave fronts in crystals by stroboscopic x-ray topography", *Synchrotron Radiation News* **15**, 17 (2002).
15. **D. Shilo**, D. Sherman, I. Beery, and E. Zolotoyabko, "Large local deflections of a dynamic crack front induced by intrinsic dislocations in brittle single crystals", *Phys. Rev. Lett.* **89**, 235504 (2002).
16. **D. Shilo**, E. Lakin, E. Zolotoyabko, J. Härtwig and J. Baruchel, " X-ray imaging of surface acoustic waves generated in semiconductor crystals by an external transducer", *Appl. Phys. Lett.* **82**, 1374-1376 (2003).
17. **D. Shilo** and E. Zolotoyabko, "Visualization of short surface acoustic waves by x-ray topography", *J. Phys. D* **36**, A122-A127 (2003).

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18. **D. Shilo** and E. Zolotoyabko, " Stroboscopic x-ray imaging of vibrating dislocations excited by 0.58 GHz phonons", *Phys. Rev. Lett.* **91** 115506 (2003).
  19. **D. Shilo**, G. Ravichandran, and K. Bhattacharya, "Investigation of twin wall structure at the nanometer scale using atomic force microscopy", *Nature Mater.* **3**, 453-457 (2004).
  20. Y. Ganor\* and **D. Shilo**, "High sensitivity nanoscale mapping of elastic moduli", *Appl. Phys. Lett.* **88**, 233122 (2006).
  21. R. Zhang<sup>1</sup>, **D. Shilo**, G. Ravichandran, and K. Bhattacharya, "Mechanical characterization of released thin films by contact loading", *J. Appl. Mech.* **73**, 730-736 (2006).
  22. **D. Shilo**, E. Burcsu<sup>1</sup>, G. Ravichandran, K. Bhattacharya, "A model for large electrostrictive actuation in ferroelectric single crystals", *Int. J. Solids and Structures* **44**, 2053-2065 (2007).
  23. **D. Shilo**, A. Mendelovich<sup>2</sup>, and V. Novak<sup>3</sup>, "Investigation of twin boundary thickness and energy in CuAlNi shape memory alloy", *Appl. Phys. Lett.* **90**, 193113 (2007).
  24. Y. Ganor, **D. Shilo**, J. Messier<sup>4</sup>, T. W. Shield, R. D. James, "Testing system for ferromagnetic shape memory microactuators", *Rev. Sci. Instrum.* **78**, 073907 (2007).
  25. **D. Shilo** and R. Ghez<sup>5</sup> "New wine in old flasks: Integrating the Clausius-Clapeyron equation", *Eur. J. Phys.* **29**, 25-32 (2008).
  26. **D. Shilo**, H. Drezner and A. Dorogoy<sup>6</sup> "Investigation of interface properties by nanoscale elastic modulus mapping", *Phys. Rev. Lett.* **100**, 035505 (2008).
  27. Y. Ganor, and **D. Shilo**, "Modulus mapping of nanoscale closure variants in Ni-Mn-Ga", *Appl. Phys. Lett.* **93**, 031905 (2008).
  28. Y. Ganor, **D. Shilo**, T. W. Shield, R. D. James, "Breaching the work output limitation of ferromagnetic shape memory alloys", *Appl. Phys. Lett.* **93**, 122509 (2008).
  29. E. Ben-David, O. Y. Kanner, and **D. Shilo**, "A new method for measuring displacements of micro devices by an optical encoding system", *Experimental Mechanics* **49**, 823 (2009).
  30. Y. Ganor, **D. Shilo**, N. Zarrouati<sup>4</sup>, R. D. James, "Ferromagnetic Shape Memory Flapper", *Sensors and Actuators: A Physical* **150**, 277-279 (2009).

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\* Students underlined

1 Students of Professors Ravichandran and Bhattacharya

2 Research assistant of Dr. Shilo

3 Contributed the CuAlNi samples

4 Students of Professors James and Shield

5 Lecturer for Thermodynamics in the Materials Engineering Department of the Technion

6 Research Associate in our department; was responsible for finite element analysis

7 Student of Prof. E. Gutmanas and Dr. I Gotman.

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31. E. Zolotoyabko and **D. Shilo**, "Comment on Interaction of a surface wave with a dislocation", *Phys. Rev. B* **80**, 136101 (2009).
  32. S. Vollach and **D. Shilo**, "The Mechanical Response of Shape Memory Alloys under a Rapid Heating Pulse", *Experimental Mechanics* **50**, 803-811 (2010).
  33. E. Faran and **D. Shilo**, "Twin Motion Faster than the Speed of Sound", *Phys. Rev. Lett.* **104**, 155501 (2010).
  34. H. Drezner, **D. Shilo**, A. Dorogoy<sup>6</sup> and E. Zolotoyabko, "Nano-scale mapping of elastic modules in biogenic composites: the nacre of mollusk shells", *Advanced Functional Materials* **20**, 2723-2728 (2010).
  35. I. Zlotnikov<sup>7</sup>, A. Dorogoy<sup>6</sup>, **D. Shilo**, I. Gotman and E. Gutmanas, "Nanoindentation, Modeling and Toughening Effects of Zirconia/Organic Nanolaminates", *Advanced Engineering Materials*, **12**, 935-941 (2010).
  36. E. Faran and **D. Shilo**, "The kinetic relation for twin wall motion in NiMnGa", *J. Mech. Phys. Solids* **59**, 975-987 (2011).
  37. E. Faran and **D. Shilo**, "Implications of twinning kinetics on the frequency response in NiMnGa actuators", *Appl. Phys. Lett.* **100**, 151901 (2012).
  38. E. Faran and **D. Shilo**, "The kinetic relation for twin wall motion in NiMnGa – part 2", *J. Mech. Phys. Solids* **61**, 726-741 (2013).
  39. I. Benichou<sup>8</sup>, E. Faran, **D. Shilo** and S. Givli, "Application of a novel bi-stable chain model for the analysis of jerky twin boundary motion in NiMnGa", *Appl. Phys. Lett.* **102**, 011912 (2013).
  40. O. Y. Kanner, **D. Shilo**, J. Sheng, R. D. James, Y. Ganor, "Ferromagnetic shape memory flapper for remotely actuated propulsion systems", *Smart Materials and Structures* **22**, 085030 (2013).
  41. I. Zlotnikov<sup>9</sup>, **D. Shilo**, Y. Dauphin<sup>9</sup>, P. Werner<sup>9</sup>, E. Zolotoyabko, and P. Fratzl, "In situ Elastic Modulus Measurements of Ultrathin Protein-Rich Organic Layers in Biosilica: towards deeper understanding of superior resistance to fracture of biocomposites", *RSC Advances* **3**, 5798 (2013).
  42. M. Kabla, H. Seiner<sup>10</sup>, M. Musilova<sup>10</sup>, M. Landa<sup>10</sup>, and **D. Shilo**, "The relationships between sputter deposition conditions, grain size, and phase transformation temperatures in NiTi thin films", *Acta Materialia* **70**, 79-91 (2014).
  43. E. Ben-David, T. Tepper-Faran<sup>211</sup>, D. Rittel, and **D. Shilo**, "A New Methodology for Uniaxial Tensile Testing of Free-Standing Thin Films at High Strain-Rates", *Experimental Mechanics* **54**, 1687-1696 (2014).

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<sup>8</sup> Student of Prof. S. Givli

<sup>9</sup> Research fellow in the department of Peter Fratzl

<sup>10</sup> Research collaborators from the Institute of Thermomechanics, Academy of Sciences of Czech Republic

<sup>11</sup> Research collaborator from Rafael.

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44. E. Ben-David, T. Tepper-Faran<sup>11</sup>, D. Rittel, and **D. Shilo**, "A large strain rate effect in thin free-standing Al films", *Scripta Materialia* **90-91**, 6-9 (2014).
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84. E. Faran and **D. Shilo**, "Dynamics of Twin Boundaries in FSMA - Review", *Materials Science and Technology* **30**, 1545-1558 (2014).
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### **Patents:**

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### **CONFERENCES<sup>†</sup>:**

#### **Plenary, keynote or invited talks:**

1. **D. Shilo**<sup>†</sup> and E. Zolotoyabko, "Visualization of short surface acoustic waves by X-ray topography", X-TOP 2002 – Grenoble, France, **Plenary**. Published in paper number 17.
2. **D. Shilo**<sup>†</sup>, H. Drezner and A. Dorogoy, “Investigation of interface properties by nanoscale elastic modulus mapping”, IMEC13, Haifa, Israel, (2007).

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<sup>†</sup> Presenting author.

Students underlined.



3. **D. Shilo**<sup>†</sup>, “Investigation of interface properties at the nanometer scale”, Nano-Bio Mechanics Workshop, Haifa, Israel, (2008).
4. **D. Shilo**<sup>†</sup> and **S. Vollach**, "The kinetics of martensite to austenite phase transformation in shape memory alloys under a rapid heating pulse", ESOMAT, September 2009, Prague, Czech Republic, **Plenary**.
5. I. Zlotnikov<sup>†</sup>, H. Drezner, **D. Shilo**, B. Aichmayer, Y. Dauphin, E. Zolotoyabko and P. Fratzl, "Mapping Nanomechanical Properties near Internal Interfaces in Biological Materials", MRS Spring Meeting 2011, San Francisco, USA, **Plenary**.
6. **D. Shilo**<sup>†</sup> and **E. Faran**, "Multi-scale dynamics of twinning processes", International Workshop on Physics Based Modeling of Material Properties and Experimental Observations, October 2012, Ankara, Turkey, **Keynote**.
7. **S. Vollach**, H. Shlagman<sup>14</sup> and **D. Shilo**<sup>†</sup>, "The Mechanical Response and Phase Transformation Kinetics of NiTi Under a Rapid Heating Pulse", International Conference on Shape Memory and Superelastic Technologies (SMST), Prague, Czech Republic, May 2013, **Plenary**.
8. **E. Faran**<sup>†</sup> and **D. Shilo**, "Twin boundary motion in NiMnGa", International Conference on Ferromagnetic Shape Memory Alloys (ICFSMA), Boise ID, USA, June 2013, **Plenary**.
9. **S. Vollach**, H. Shlagman<sup>14</sup> and **D. Shilo**<sup>†</sup>, "The Mechanical Response and Phase Transformation Kinetics of NiTi Under a Rapid Heating Pulse", Annual Conference of the Society of Engineering Science (SES2013), Brown University, Providence, RI, USA, July 2013, **Keynote**.
10. **D. Shilo**<sup>†</sup>, E. K. H. Salje<sup>12</sup>, and **E. Faran**, "The exploration of the effect of microstructure on crackling noise systems", Avalanches in Functional Materials and Geophysics (AFM&G), December 2014, Cambridge University, UK, **45 min lecture**.
11. **D. Shilo**<sup>†</sup>, **N. Zreihan**, and **E. Faran**, "Microstructural and Rate Effects in Crackling Noise Systems", Avalanches in Condensed Matter Physics and Beyond, January 2017, Barcelona, Spain, **60 min lecture**.
12. **A. Dana**<sup>†</sup>, H. Sekiguchi, K. Aoyama, **E. Faran**, K. D. Liss, and **D. Shilo**, “Unraveling the rate of the martensitic transformation: A microsecond-scale time-resolved X-ray diffraction study”, *Virtual Annual Meeting of the Society of Engineering Science (SES2020)*.
13. **A. Dana**, H. Sekiguchi, K. Aoyama, **E. Faran**, K. D. Liss, and **D. Shilo**<sup>†</sup>, “How fast is the reverse martensitic transformation in shape memory alloys”, *THERMEC 2021 (Virtual)*.

**Refereed papers in conference proceedings:**

14. **D. Shilo**<sup>†</sup> and **Y. Ganor**<sup>\*</sup>, “Optimization Method for Acquiring High Resolution Mapping of Elastic Moduli”, Society for Experimental Mechanics Annual Conference, St. Louise, USA, 2006.

15. Y. Ganor<sup>†</sup>, **D. Shilo**, J. Messier, T. W. Shield, R. D. James, "Testing system for ferromagnetic shape memory micro-actuators", International Conference on Experimental Mechanics (ICEM13), Alexandroupolis, Greece, 2007.
16. **D. Shilo**<sup>†</sup>, H. Drezner, A. Mendelovich, "Electromechanical Response of Large Strain Ferroelectric Actuators", ASME Engineering Systems Design and Analysis Conference (ESDA 2008), Haifa, Israel, 2008.
17. Y. Ganor<sup>†</sup> and **D. Shilo**, "Work Output Enhancement of Ferromagnetic Shape Memory Micro Actuators", ASME Engineering Systems Design and Analysis Conference (ESDA 2008), Haifa, Israel, 2008.
18. Y. B. Weber<sup>†</sup>, **D. Shilo**, D. Schweitzer, H. Bar, "Health Monitoring of Adhesive Joints using Magnetostrictive Fillers", ASME Engineering Systems Design and Analysis Conference (ESDA 2008), Haifa, Israel, 2008.
19. E. Ben-David<sup>†</sup>, D. Elata, D. Rittel, **D. Shilo**, "A New Instrument for Tensile Testing of Thin Free Standing Films at High Strain Rates", ASME Engineering Systems Design and Analysis Conference (ESDA 2008), Haifa, Israel, 2008.
20. Y. B. Weber<sup>†</sup>, **D. Shilo**, D. Schweitzer, H. Bar, "Structural health monitoring of adhesive joints using magnetostrictive materials", ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS2008), Maryland, USA, 2008.
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22. E. Faran and **D. Shilo**<sup>†</sup>, "Twin Boundary Motion in NiMnGa", International Conference on Shape Memory and Superelastic Technologies (SMST), Prague, Czech Republic, (2013).
23. M. Kabla and **D. Shilo**<sup>†</sup>, "Deposition and Characterization of NiTi Thin Films on Full Wafer", International Conference on Shape Memory and Superelastic Technologies (SMST), Prague, Czech Republic, (2013).

**Contributed talks (with abstract):**

24. N. Mainzer<sup>†</sup>, **D. Shilo**, E. Zolotoyabko, G. Bahir, and A. Sher, "Characterization of the CdTe/HgCdTe heterostructures by high-resolution x-ray diffraction". The 1996 U.S. Workshop on the Physics and Chemistry of II-VI Materials, Las-Vegas, USA, 1996. Published in paper number 1.
25. E. Zolotoyabko<sup>†</sup> and **D. Shilo**, "Control of static strains in crystals by the dynamic pressure of phonon flow". Ultrasonics International' 97, Delft, The Netherlands, 1997. Published in paper number 3.
26. Y. Avrahami, **D. Shilo**, N. Mainzer, and E. Zolotoyabko<sup>†</sup>, "Study of atomic diffusion in crystalline structures by high-resolution X-ray diffraction", 12-th International Conference on Crystal Growth, Jerusalem, Israel, 1998.

27. E. Zolotoyabko<sup>†</sup>, **D. Shilo**, W. Sauer, E. Pernot and J. Baruchel. "Stroboscopic X-ray topography in crystals under 10  $\mu\text{m}$ -surface acoustic wave excitation", 4-th European Symposium on X-Ray Topography and High Resolution Diffraction, Durham, UK, 1998.
28. **D. Shilo**<sup>†</sup>, D. Sherman, and E. Zolotoyabko, "The effect of intrinsic dislocations on rapidly propagating cracks in brittle single crystals", First Israel-Japan Bi-National Workshop on Dynamic Response of Brittle Solids, Neve-Ilan Israel, 2001.
29. **D. Shilo**<sup>†</sup> and E. Zolotoyabko, Visualization of surface acoustic wave scattering by dislocations, Ultrasonics International – UI-01, Delft, The Netherlands, 2001. Published in paper number 13.
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32. **D. Shilo**<sup>†</sup>, G. Ravichandran, and K. Bhattacharya, Investigation of Twin Wall Structure at the Nanometer Scale using Atomic Force Microscopy, ICME 2005, Tel Aviv, Israel, 2005.
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58. E. Faran<sup>†</sup>, I. Benichou, S. Givli and **D. Shilo**, “What is the physical origin for the twinning stress in Ni-Mn-Ga?”, *International Conference on Ferromagnetic Shape Memory Alloys, ICFSMA 2019*, Prague, Czech Republic (2019).
59. N. Zreihan, E. Faran and **D. Shilo**<sup>†</sup>, “The Effect of Loading Rate on Characteristics of Twin Boundary Motion in Ni-Mn-Ga”, *International Conference on Ferromagnetic Shape Memory Alloys, ICFSMA 2019*, Prague, Czech Republic (2019).
60. E. Faran<sup>†</sup> and **D. Shilo**, “Kinetic laws for the motion of twin boundaries in ferroic materials: the role of twinning disconnections”, *Dislocations 2019*, Haifa, Israel (2019).
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63. **D. Shilo**<sup>†</sup> and E. Faran, “Multi-scale Dynamics of Twinning in Ferroic Materials”, *Virtual Annual Meeting of the Society of Engineering Science (SES2020)*.

### Special Organizational Activities in Conferences:

- 2020 Guest Editor of a Special Issue on *Structure and Motion of Material Interfaces in Shape Memory and Superelasticity*.
- 2020 Organizing a session on *Structure and Motion of Material Interfaces* in the Virtual Annual Meeting of the Society of Engineering Science (SES2020).
- 2013 Organizing a session on *Mechanics of Phase Transforming and Multifunctional Materials* in the Annual Meeting of the Society of Engineering Science (SES2013), Brown University, USA, together with Kaushik Dayal (Carnegie Mellon) and Liping Liu (Rutgers).

- 2012 Organizing a session on *Shape Memory and Smart Materials* in the Israeli Conference on Mechanical Engineering (ICME 32), Tel Aviv, Israel.
- 2012 Organizing a session on *Mechanical Behavior of Advanced Materials* in the Israeli Conference on Mechanical Engineering (ICME 32), Tel Aviv, Israel.
- 2008 Organizing a session on *Smart Materials and Actuation* in the ASME Engineering Systems Design and Analysis Conference (ESDA 2008), Haifa, Israel, 2008.
- 2006 Organizing a short workshop on Nano-mechanical Measurements and hosting it at the Department of Mechanical Engineering, Technion.

**Seminar talks:**

University of California at Santa Barbara, Department of Mechanical and Environmental Engineering, "Dynamics and Interactions of Crystal Defects", 2004.

Technion – Israel Institute of Technology, Faculty of Mechanical Engineering, "Mechanics of materials in the nm and  $\mu\text{m}$  scales", 2004.

Ben-Gurion University, Department of Mechanical Engineering, "Mechanics of materials in the nm and  $\mu\text{m}$  scales", 2005.

Technion – Israel Institute of Technology, Nanomechanical Testing Seminar (over 50 participants from Israeli academic and industrial institutions), "Advanced Nanomechanical Characterization Techniques", 2006.

Tel-Aviv University, Faculty of Engineering, "Investigation of mechanical properties at the nm-scale", 2006.

Technion – Israel Institute of Technology, Faculty of Materials Engineering, "Investigation of Twin Wall Properties at the Nanometer Scale", 2006.

MIT, Department of Mechanical Engineering, MMEC seminar series, "Investigation of Twin-Wall Properties at the Nanometer Scale", 2008.

University of Minnesota, Department of Aerospace Engineering and Mechanics, Colloquium (Departmental seminar), "Investigation of Twin-Wall Properties at the Nanometer Scale", 2008.

Tel-Aviv University, School of Mechanical Engineering, "Investigation of interface properties at the nanometer scale", 2009.

Caltech, GALCIT Colloquium Seminar, "Multiscale experimental study of twinning transformation in ferroelastic and ferroelectric materials", 2010.

Max Planck Institute of Colloids and Interfaces, Germany, Department of Biomaterials, "Study of biogenic composites by nano-scale elastic modulus mapping", 2011.

General Motors, Warren, USA, "High strain rate electrical actuation of shape memory alloy wires", 2011.

General Motors, Warren, USA, "High strain rate electrical actuation of shape memory alloy wires", 2012.

Boise State University, Department of Materials Engineering, "Dynamics of twinning processes in active materials", 2012.

University of Dortmund, Department of Mechanical Engineering, "Multi-scale dynamics of non-180° domain switching processes in ferroic materials", 2013.

University of Duisburg-Essen, Research Seminar on Mechanics, "Multi-scale dynamics of non-180° domain switching processes in ferroic materials", 2013.

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