Curriculum Vitae

Shmuel Osovski

Academic Degrees

2009 - 2013:	Ph.D. Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, Haifa, Israel
2004 - 2006	M.Sc. Faculty of Chemistry, Technion - Israel Institute of Technology, Haifa, Israel
1999 - 2004	B.Sc./ B.A. Faculty of Materials Engineering / Faculty of Chemistry Technion - Israel Institute of Technology, Haifa, Israel

Academic Appointments

2014 - present	Assistant Professor, Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, Haifa, Israel
2012 - 2014	Postdoctoral Research Fellow, Center for Advanced Non-Ferrous Structural Alloys (CANFSA), University of North Texas, TX, USA

Professional Experience

2007 - 2009	System Engineer, Israeli Air Force (IAF)
2004 - 2007	Research Scientist, Israeli Defense Forces (IDF)

Research Interests

Experimental and computational mechanics of materials: fractographic and statistical analysis of fracture surfaces; microstructure characterization and evolution; in-situ SEM mechanical experiments; damage mechanics; dynamic fracture mechanics; computational plasticity and fracture.

Teaching Experience

2018	CISM, International Center for Mechanical Sciences, Italy *Damage and Failure of Materials Under Extreme Conditions*.
2012 - present	Lecturer, Technion - Israel Institute of Technology

034033	*Numerical Analysis (undergraduate)*
034044	*Introduction to experimental methods (undergraduate)*
035034	*Failure of Materials (undergraduate)*
036004	*Fracture Mechanics (graduate & undergraduate). Course redesigned*
036075	*Modeling The Mechanical Behavior of Materials (graduate & undergraduate). New course developed.*
038742	*Plasticity (graduate). Course redesigned.*

Technion Activities

N/A

Departmental Activities

2020	Part of the team behind the new course “Introduction to Scientific and Engineering Computing”
2017 - present	In charge of the “REAMIM” excellency program
2016 - 2017	In charge of faculty seminars
2015	Designed a new experiment for the Experimental Methods Laboratory (034093)

Public Professional Activities

Conference organization

- Co-organizer & co-chairman, mini-symposium on "*Effect of Spatio-Temporal Length Scales on Ductile Failure*" at the International Conference on Plasticity, Damage, and Fracture, San Juan, Puerto Rico, January 3-9, 2018.
- Co-organizer & co-chairman, mini-symposium on "*Advances in Correlating Length Scales and Ductile Failure*" at the 13th World Congress on Computational Mechanics and 2nd Pan American Congress on Computational Mechanics, New York City, NY, July 22-27, 2018.
- Co-organizer & co-chairman, mini-symposium on "*Effect of Spatio-Temporal length scales on ductile failure*" at the International Conference on Plasticity, Damage and Fracture, Panama City, Panama, January 3-9, 2019.
- Co-organizer & co-chairman, mini-symposium on "*Plastic instability and fracture in ductile materials*" at the 16th International Conference on Computational Plasticity Fundamentals and Applications, Barcelona, Spain, September 7-10, 2021.

Reviewer for funding agencies

- Israel Science Foundation (ISF)

Reviewer for peer-reviewed journals

- Acta Materialia
- Journal of the Mechanics and Physics of Solids
- Engineering Fracture Mechanics
- International Journal of Fracture
- Metals
- Materials
- Mechanics of Materials
- Infrared Physics & Technology
- Computational Materials Science
- International Journal of Impact Engineering
- International Journal of Mechanical Sciences
- Materials & Design
- Materials Research Letters
- Scientific Reports

Membership in Professional Societies

N/A

Fellowships, Awards and Honors

2014	Aharon and Ovadia Barazani prize for excellent Ph.D. thesis. Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, Haifa, Israel.
2012	Mechanical Engineering Faculty Research Poster Award, Technion Israel Institute of Technology, Haifa, Israel
2011	Jacobs Excellence Scholarship Award, Technion Israel Institute of Technology, Haifa, Israel

Graduate Students

Completed Ph.D. theses (4)

1.	Long Hui Zhang Co-adviser: D. Rittel	*Controlling adiabatic shear failure by tailoring microstructural toughening factors.*	2018
2.	Juan Carlos Nieto Fuentes Co-adviser: D. Rittel	*A reassessment of the thermomechanical coupling in solids subjected to dynamic loading*	2019
3.	Sagi Chen	*Unraveling Damage Processes at the Microstructural Level*	2020
4.	Stylianons Tsopanidis Co-adviser: J.A. Rodríguez-Martínez from University Carlos III, Madrid, Spain	*Novel Metrology Tools Based on Artificial Intelligence to Study Damage in Aerospace Structures*	2020

Completed M.Sc. theses (5)

1.	Yali Barak Graduated cum laude	*"Fracture toughness and fracture surface roughness: do they scale?*	2019
2.	Stav Yalon	*Void Interactions in a mode I field.*	2019
3.	Elan Weisberg	*Ductile fracture under complex loading scenarios: Experimental and numerical investigation*	2019
4.	Efrat Lev	*Size effects in continuum theories in micron*	2019

		length scale	
5.	Yarden Markovich	*Energy Absorption in AM Ti6Al4V Thin-Walled Cylinders*	2020

Ph.D. theses in progress (3)

1.	Irfan Habeeb Chuzahli Nilat	*Crack-flaws interaction in brittle media (*thesis submitted in 2020)	2016-2021
2.	Eyal Eshed	*The Microstructural and Mechanical Properties of AlCrFe2Ni2 alloy*	2018-2021
3.	Shai Essel	*Microstructural evolution of LPSO's and their effect on the mechanical behavior of RE containing Mg alloys*	2020-2023

M.Sc. theses in progress (7)

1.	Tal Namir	*Joining of dissimilar metal using Equal Channel Angular Pressing*	2016-2021
2.	Yuval Tal	*Energy Absorption in twisted structures*	2018-2021
3.	Galina Rakhman	*Strain localization and failure of heterogeneous mesostructured materials*	2019-2021
4.	Avner Shmuel	*Neural networks for damage mechanics*	2017-2021
5.	Noam Cooperschmidt	*Microstructure and mechanical properties of Calcium containing Mg alloys*	2019-2021
6.	Dror Freedman	*Roughness toughness correlation and the effect of particle size and spacing on ductile fracture of metal matrix composite*	2019-2021
7.	Idan Distelfeld	*Design of new interpenetrating phase composites*	2020-2022

Sponsored long-term visitors and post-doctoral associates

1.	Stylianos Tsopanidis	*Postdoc*	2020 -

Research Grants

Competitive (986K Euro)

Period	Title	Source	Amount
2016 - 2019	"*OUTCOME - The outstanding challenge in solid mechanics: engineering structures subjected to extreme loading conditions*" Co-PI along with J.A Rodrigez-Martinez, G. Vadillo, S. Mercier, C. Dascalu, L. Bodin, R. Herrerro & D. Rittel. Total funding – 2,052K Euro	EU Horizon 2020, MSCA-ITN-2015-ETN	250K Euro
2016 - 2021	"*The Role of Heterogeneities in Mechanics of Materials*". *PI*	Pazy foundation young researchers	1,500K NIS
2017 - 2021	"*Can We Improve The Mechanical Properties and Stability of Irradiated Thin films?* " PI with Dr. I. Gouzman from Soreq as co-PI	Pazy foundation research grant	812K NIS
2017 - 2019	"*Nanostructured Metals for Structural Applications under Extreme Conditions*". PI with Prof. G. Qiang from Shanghai Jiao Tong University as co-PI	Israel Ministry of Science (China collaboration grant)	507K NIS
2018 - 2022	"*QUANTIFY -Unraveling the role of anisotropy in material failure*". Co-PI with C. Czarnota, J.A Rodrigez-Martinez,, K. Kowalczyk-Gajewska. Total funding – 153K Euro	EU Horizon 2020 MSCA-RISE -2017	22K Euro

Industrial and other sources (437K Euro)

Period	Title	Source	Amount
2020 - 2021	"*Computational-experimental optimization of additively manufactured high strength aluminum alloys*"	Israel Innovation Authority - "Maymad as Nofar"	452K NIS
2020 - 2021	"*Tailoring the microstructure of WE43 Mg alloy via hybrid experimental computational approach for increased malleability*"	Israel Innovation Authority - "Nofar"	513K NIS
2021 - 2023	"*LAMP - Lasers for Advanced Material Processing*" Coordinator of the simulation group which includes S. Frenkel (Mechanical Eng., Technion) and M. Bamberger (Materials Sci.&Eng., Technion) Total group budget 1,404K NIS	Israel Innovation Authority - "MAGNET"	760K NIS

Publications

Theses

T1. **S. Osovski,** "*Fingerprints of Classical Chaos in Manipulation of Cold Atoms in One-dimensional Optical Lattices*", M.Sc. thesis, Faculty Chemistry, Technion, Israel Institute of Technology, 2006. Adviser: Prof. N. Moiseyev

T2. **S. Osovski**, "*Initiation of Adiabatic Shear Bands from a Microstructural Standpoint*", Ph.D. dissertation, Faculty of Mechanical Engineering, Technion, Israel Institute of Technology, 2013. Advisors: Prof. D. Rittel and Dr. A. Venkert

Refereed papers in professional journals

J1. V. Averbukh, **S. Osovski**, N. Moiseyev (2002), "Controlled Tunneling of Cold Atoms: From Full Suppression to Strong Enhancement", Phys. Rev. Lett. 89, 253201.

J2. **S. Osovski**, N. Moiseyev (2005), "Fingerprints of classical chaos in manipulation of cold atoms in the dynamical tunneling experiments", Phys.

Rev. A. 72, 033603.

J3. D. Rittel, **S. Osovski** (2010), “Dynamic failure by adiabatic shear banding”, Int. J. Fracture, (162), 177-185.

J4. **S. Osovski**, D. Rittel, P. Landau and A. Venkert (2012), “Microstructural effects on adiabatic shear band formation “, Scripta Materialia (66),9-12.

J5. **S. Osovski**, Y. Nahmany, D. Rittel, P. Landau and A. Venkert (2012), “On the dynamic character of localized failure”, Scripta Materialia (67), 693-695.

J6. **S. Osovski** and D. Rittel (2012), “Microstructural heterogeneity and dynamic shear localization” Appl. Phys. Lett. 101 211901.

J7. **S. Osovski**, D. Rittel, and A. Venkert, (2013) “The respective influence of microstructural and thermal softening on adiabatic shear localization” Mechanics of Materials (56), 11-22.

J8. J. A. Rodrıguez-Martınez, D. Rittel, R. Zaera and **S. Osovski**, (2013), “Finite element analysis of AISI 304 steel sheets subjected to dynamic tension: the effect of martensitic transformation and plastic wave propagation on flow localization”, International Journal of Impact Engineering (54), 206-216.

J9. **S. Osovski**, D. Rittel, J. A. Rodrıguez-Martınez and R. Zaera, (2013), “Dynamic tensile necking: influence of specimen geometry and boundary conditions." Mechanics of Materials (62), 1-13.

J10. A. Srivastava, L. Ponson, **S. Osovski**, E. Bouchaud, V. Tvergaard, A. Needleman, (2014), “Effect of inclusion density on ductile fracture roughness and toughness.“ Journal of the Mechanics and Physics of Solids (63), 62-79.

J11. **S. Osovski**, A. Srivastava, J. C. Williams, A. Needleman, (2015), “Grain boundary crack growth in metastable titanium β alloys.” Acta Materialia (82), 167-178.

J12. **S. Osovski**, A. Srivastava, L. Ponson, E. Bouchaud, V. Tvergaard, K. Ravi-Chandar A. Needleman, (2015), “Effect of loading rate on ductile fracture roughness and toughness.“ Journal of the Mechanics and Physics of Solids, (76), 20-46.

From here on, I list my publications since joining the Technion. My group members are underlined.

J13. Y. Rotbaum, **S. Osovski**, D. Rittel, (2015)“ Why does necking ignore notches in dynamic tension?”, Journal of the Mechanics and Physics of Solids, (78), 173-185.

J14. P. Landau, **S. Osovski**, A. Venkert, G. Gartnerova, D. Rittel, (2016), “The genesis of adiabatic shear bands” Scientific Reports, (6), 37226.

J15. A. Srivastava, **S. Osovski**, A. Needleman, (2017), ”Engineering the crack path by controlling the microstructure”, Journal of the Mechanics and Physics of Solids, (100), 1-20.

J16. D. Rittel, L.H. Zhang, **S. Osovski**, (2017), “Mechanical Characterization of Impact-Induced Dynamically Recrystallized Nanophase”, Physical Review Applied,(7),044012.

J17. D. Rittel, L.H. Zhang, **S. Osovski**, (2017), “The dependence of the Taylor - Quinney coefficient on the dynamic loading mode”, Journal of the Mechanics and Physics of Solids,(107), 96-114.

J18. D. Gerbig, A. Srivastava, **S. Osovski**, L.G. Hector Jr., A. Bower, (2018), “Analysis and design of dual-phase steel microstructure for enhanced ductile fracture resistance”, International Journal of Fracture, (1-2), 3-26.

J19. S. Chen, **S. Osovski**,(2018)" A new specimen for growing dynamic cracks along a well defined path using stress wave loading", Engineering Fracture Mechanics, (191), 102-110.

J20. KE N’souglo, A Srivastava, **S Osovski**, JA Rodríguez-Martínez, (2018), "Random distributions of initial porosity trigger regular necking patterns at high strain rates", Proc. R. Soc. A 474 (2211), 20170575.

J21. J.C. Nieto-Fuentes, D. Rittel, **S. Osovski**, (2018), "On a dislocation-based constitutive model and dynamic thermomechanical considerations", International Journal of Plasticity, 108, 55-69.

J22. L.H. Zhang, D. Rittel, **S. Osovski**, (2018), “Thermo-mechanical characterization and dynamic failure of near α and near β titanium alloys”, Materials Science and Engineering: A, (729), 94-101.

J23. N. Emuna, D. Durban, **S. Osovski**, (2018), “Sensitivity of Arterial Hyperelastic Models to Uncertainties in Stress-Free Measurements”, Journal of Biomechanical Engineering, 140(10), 101013.

J24. DZ Xidan, Zan Li, Qiang Guo, Genlian Fan, Zhiqiang Li, Ding-Bang Xiong, Zhanqiu Tan, Tishi Su, **S. Osovski**, Di Zhang, (2018), "Orientation-Dependent Tensile Behavior of Nanolaminated Graphene-Al Composites: An In Situ Study", Metallurgical and Materials Transaction A, 49(11), 5229-5234.

J25 L. Zhao, Q. Gao, Y. Shi, Y. Liu, **S. Osovski**, Z. Li, D.B. Xiong, Y. Su, S. Zhang, (2019), "Interfacial effect on the deformation mechanism of bulk nanolaminated graphene–Al composites", Metallurgical and Materials Transaction A, 50(3), 1113-1118.

J26. H.R. Jessel, S. Chen, **S. Osovski**, S. Efroni, D. Rittel, I. Bachelet, (2019), "Design Principles of biologically fabricated avian nests", Scientific Reports, 9 (1), 4792.

J27. **S. Osovski**, A. Needleman, S. Srivastava,(2019), "Intergranular fracture prediction and microstructure design", International Journal of Fracture, 216(2), 135-148.

J28. L. Zhao, Q. Guo, Z. Li, DB. Xiong, **S. Osovski**, Y. Su, D. Zhang, (2019),"Strengthening and deformation mechanisms in nanolaminated graphene-Al composite micro-pillars affected by graphene in-plane sizes", International Journal of Plasticity, 116, 265-279.

J29. S. Chen, **S. Osovski**, (2019), "The effect of internal pressure in gas containing materials on their mechanical stability under shear", Mechanics Research Communications, 98, 37-41.

J30. Y. Barak, A. Srivastava, **S. Osovski**, (2019), "Correlating fracture toughness and fracture surface roughness via correlation length scale", International Journal of Fracture, 219(1), 19-30.

J31. Y. Liu, X. Zheng, **S. Osovski**, A. Srivastava, (2019), "On the micromechanism of inclusion driven ductile fracture and its implications on fracture toughness", Journal of the Mechanics and Physics of Solids, 130, 21-34.

J32. Y. Shi, L. Zhao, Z. Li, Z. Li, D.B. Xiong, Y. Su, **S. Osovski**, Q. Guo, (2019), "Strengthening and deformation mechanisms in nanolaminated single-walled carbon nanotube-aluminum composites" Materials Science and Engineering: A, 764, 138273.

J33. J. C. Nieto-Fuentes, **S. Osovski**, A. Venkert, D. Rittel, (2019), "A reassessment of the dynamic thermomechanical conversion in metals", Physical Review Letters, 123,255502.

J34. A. Molkeri, A. Srivastava, **S. Osovski**, A. Needleman, (2020), "Influence of Grain Size Distribution on Intergranular Crack Growth Resistance", Journal of Applied Mechanics, 87(3): 031008.

J35. J. Reboul, A. Srivastava, **S. Osovski**, G. Vadillo, (2020), "Influence of Strain Rate Sensitivity on Localization and Void Coalescence", International Journal of Plasticity, 125,265-279.

J36. S. Chen, **S. Osovski**, (2020), "Damage evolution around shear loaded inter-void ligaments in plane strain and plane stress", European Journal of Solid Mechanics A/Solids,80,103909.

J37. S. Tsopanidis, RH. Moreno, **S. Osovski** (2020), "Toward quantitative fractography using convolutional neural networks", Engineering Fracture Mechanics, 106992.

J38. J. C. Nieto-Fuentes, **S. Osovski**, D. Rittel, (2020), "High-speed infrared thermal measurements of impacted metallic solids". MethodsX, 100914.

J39. S. Chen, **S. Osovski**, "Damage mechanisms in pore containing shear compression\tension specimens", Mechanics of Materials, 148, 103513.

J40. E. Eshed, S. Abd El Majid, M. Bamberger, **S. Osovski**, "TEM and High-Resolution TEM Investigation of phase formation in High Entropy Alloy AlCrFe2Ni2", Frontiers in Materials, 7, 284.

J41. T. Henseler, **S. Osovski**, M. Ullmann, R. Kawalla, U. Prahl, "GTN model-based material parameters of AZ31 magnesium sheet at high temperatures by means of SEM in-situ testing", Crystals, 10, 856.

J42. U. Hecht, S. Gein, O. Stryzhyboroda, E. Eshed, **S. Osovski** (2020) "The BCC-FCC phase transformation pathways and crystal orientation relationships in dual phase materials from Al-(Co)-Cr-Fe-Ni alloys", Frontiers in Materials, 7, 287.

J43. O. Dolev, **S. Osovski**, A. Shirizly, (2020) "Ti6Al4V Hybrid Structure Mechanical Properties – Wrought and Additive Manufactured Powder-Bed Material". Additive Manufacturing, 101657.

Submitted papers and in final stages prior to submission

S1. S. Tsopanidis, **S. Osovski**, "Unsupervised Machine Learning in Fractography: Evaluation and Interpretation", under review.

S2. C. N. Irfan Habeeb, **S. Osovski**, “Experimental and numerical study of the interaction between dynamically loaded cracks and pre-existing flaws in edge impacted PMMA specimens”, under review.

S3. E. Eshed, D. Coudhuri, **S. Osovski**, “M7C3: The story of a misunderstood carbide”, under review.

Conferences

(Speaker underlined)

Invited talks

I1. Y. Barak, D. Freedman, S. Osovski “Extracting Quantitative Information From Fracture Surfaces of Al Alloys and MMC” International Mechanical Engineering Congress & Exposition, Salt Lake City, Utah, 2019

I2. S. Osovski, A. Needelman, A. Srivastava “A Simplified Model for Intergranular Fracture Prediction”, COMPLAS XV, Barcelona, Spain, 2019

I3. S. Osovski, E. Weisberg, “Ductile fracture of additively manufactured Ti6Al4V alloy under varying load paths” Int. Conf. on Plasticity, Damage and Fracture, Panama City, Panama, 2019

I4. S. Osovski, Y. Barak, A. Srivastava, "Correlating fracture surface roughness and fracture toughness under varying loading rates", Int. Conf. on Plasticity, Damage, and Fracture, San Juan, Puerto Rico, 2018

Contributed Talks and Posters

C1. Y. Markoviz, S. Osovski, “Energy Absorption in AM Ti6Al4V Thin Walled Cylinders”, Society of Engineering Science annual meeting, St. Louis, Missouri, 2019

C2. S. Osovski, S. Yalon, “The effect of boundary conditions on void by void vs. multiple void growth”, EUROMECH, Madrid, Spain, 2019

C3. Y. Barak, A. Srivastava, S. Osovski, “Fracture surface roughness and fracture toughness: do they scale?”, Society of Engineering Science 55th annual meeting, Madrid, Spain, 2018.

C4. S. Osovski, “How to Choose a Length Scale?” 13th world congress on Computational Mechanics, New York, New York, 2018

C5. Irfan Habeeb Chuzhali Nilath, S. Osovski, “An experimental study on crack-hole interaction under dynamic loads”, 22nd European Conference on Fracture, Belgrad, Serbia, 2018

C6. Y. Barak, S. Osovski, "Ductile fracture of Al 6061-T6 how do length scale and timescale correlate", ISIG 7th symposium, Tel Aviv, Israel, 2018

C7. D. Freedman, S. Osovski, "Roughness Toughness correlations in metal matrix composites", 18th Israeli Materials Engineering Conference, Dead Sea, Israel 2018

C8. Y. Barak, A. Srivastava, S. Osovski, "The effect of loading rate on ductile fracture toughness and fracture surface roughness – an experimental study" , Society of Engineering Science 54th annual meeting, Boston, Massachusetts 2017

C9. N. Amuna, S. Osovski, D. Durban, “Sensitivity of Arterial Hyperelastic Material Parameters to Uncertainties in Stress-Free Parameters”, Society of Engineering Science 54th annual meeting, Boston, Massachusetts 2017

C10. S. Osovski, S. Chen “A new specimen for dynamic mode I crack propagation under stress waves loading”, ISIG 6th symposium, Tel Aviv, Israel 2017

C11. S. Osovski “Crack Path selection in brittle media containing designed distributions of flaws”, 2016 EMI international conference, Metz, France 2016

C12. S. Osovski “Microstructural heterogeneity & dynamic shear localization”, IUTAM Symposium on Dynamic Instabilities in Solids, Madrid, Spain 2016

C13. S. Chen and S. Osovski "A New Specimen for Dynamic Mode I Crack Propagation Under Stress Waves Loading" Society of Engineering Science 52th annual meeting, College Station, Texas 2015

C14. S. Osovski, A. Srivastava, A. Needleman "Rate Effects on Ductile Crack Growth Mechanism – From Void-by-void Crack Growth to Diffused Damage" Society of Engineering Science 52th annual meeting, College Station, Texas 2015

C15. S. Osovski "Modeling Ductile Fracture Toughness and Fracture Surface Roughness" ISTAM 2014 annual symposium, Tel-Aviv, Israel 2014

C16. S. Osovski, A. Srivastava, A. Needleman, J. Williams, “ Crack growth along grain boundaries in metastable β Ti alloys" ISIG 4th symposium, Tel-Aviv, Israel 2014

C17. S. Osovski, A. Srivastava, A. Needleman, J. Williams, “Mechanisms associated with damage tolerance in Ti alloys”, COMPLAS XII, Barcelona, Spain 2013

C18. S. Osovski, A. Srivastava, A. Needleman, J. Williams, “Mechanisms associated with damage tolerance in Ti alloys”, Society of Engineering Science 50th annual meeting, Providence Rhode Island 2013

C19. S. Osovski, D. Rittel, P. Landau and A. Venkert “Initiation of adiabatic shear bands from a microstructural standpoint ” Society of Engineering Science 50th annual meeting, Providence Rhode Island 2013,

C20. S. Osovski, D. Rittel, P. Landau and A. Venkert “The cause for adiabatic shear failure: microstructural, thermal or both? ” IUTAM Symposium, "fracture phenomena in nature and technology", Brescia, Italy 2012

C21. S. Osovski, D. Rittel, P. Landau and A. Venkert “Initiation of adiabatic shear failure: when microstructure and temperature compete” 15th Israeli Materials Engineering Conference, Dead Sea, Israel 2012

C22. S. Osovski, D. Rittel, P. Landau and A. Venkert "Microstructural aspects of adiabatic shear bands" An informal gathering on: "The mechanics and physics of solids", Weizmann Institute of Science, Israel 2011