

## **Dan Mordehai**

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### **PERSONAL INFORMATION**

**Born:** Israel, 17 May, 1976

**Gender:** Male

**Martial Status:** Single (no children)

**Citizenship:** Israeli

**Languages:** Hebrew (mother tongue language), English (fluent), French (good)

**Military Service:** 1994-2003 (*Talpiot* project, dismissed in Captain rank).

### **ACADEMIC DEGREES**

Ph.D. (2006) - Tel-Aviv University, School of Physics and Astronomy.  
(*in direct track*)

B.Sc. (1997) - The Hebrew University of Jerusalem, Physics and Mathematics (in the framework of the academic military excellence project "*Talpiot*").

### **ACADEMIC APPOINTMENTS**

2011 – Present - **Senior Lecturer**, Faculty of Mechanical Engineering, Technion – Israel Institute of Technology.

2008 – 2011 - **Postdoctoral Research Associate**, Department of Materials Engineering, Technion, Israel.

2006 – 2008 - **Postdoctoral Research Associate**, Service de Recherches de Métallurgie Physique, CEA/Saclay, France.

### **PROFESSIONAL EXPERIENCE**

1997 – 2003 - **Research Engineer**, Head of the Simulation and Modeling Group in the Terminal Ballistics Department at the Armor Branch, Mil. P.O. Box 01055, IDF, Israel.

## **RESEARCH INTERESTS**

- **Multiscale Materials Modelling** - Constitutive models for metals at the nanoscale, Deformation of nanoparticles, Surface dislocation nucleation, Relation between microstructure and macroscopic properties, High strain-rate deformation.
- **Developing atomistic/mesoscopic simulations tools** - Molecular Dynamics (MD), Discrete Dislocation Dynamics (DDD), Coupling diffusion theory with discrete dislocation dynamics simulations.
- **Contact mechanics** - Adhesion between surfaces at the nanoscale, Pseudoelastic deformation, Metal-Ceramic interfaces, Structure of interfaces.
- **Mechanical properties of material under irradiation.**
- **Dynamics properties of the dislocation microstructure** - dislocation dynamics, thermally activated processes in dislocations, high velocity dislocations, dislocation nucleation.

## **TEACHING EXPERIENCE**

- *Classical Mechanics and Electricity for Applicants to the School of Medicine*- Teacher, Medical School, Tel Aviv University, Summer 2005, Summer 2008, Summer 2009, summer 2010, summer 2011.
- *Classical Mechanics for Engineers (0509-1826)* - Teacher Assistant, School of Physics and Astronomy, Tel Aviv University, Fall 2003, Spring 2004, Fall 2004, Spring 2005.

## **PUBLIC PROFESSIONAL ACTIVITIES**

**Reviewer for journals:** Physical Review Letters, Physical Review B, Philosophical Magazine, Philosophical Magazine Letters, Journal of Materials Science.

## **MEMBERSHIP IN PROFESSIONAL SOCIETIES**

TMS - The Minerals, Metals and Materials Society.  
IACMM - Israel Association for Computational Methods in Mechanics.

## **HONORS AND AWARDS**

- 1994 – 1995 - Enlisted on the dean's list, Faculty of Science, Hebrew University in Jerusalem.
- 1997 - Award for excellent graduating officer of Talpiot.
- 2004 - Award for excellence in teaching (teacher assistance).
- 2008 - Qualifié maître de conférences, N° de qualification 08228185801 (date du résultat 06/02/2008).
- 2009-2011 - Fine Fellowship, Technion (for 2 years, 10/2009-10/2011)

## **PUBLICATIONS**

### **Theses**

D. Mordehai, "Relation Between Microscopic Properties and Macroscopic Dynamic Properties of Metals", Thesis, Tel Aviv University (2006).

### **Papers in Peer-reviewed Journals**

1. D. Mordehai, Y. Ashkenazy, I. Kelson and G. Makov, "[Dynamic Properties of Screw Dislocation in Cu: A molecular dynamics study](#)", *Phys. Rev. B.* **67**, 024112 (2003).
2. D. Mordehai, I. Kelson and G. Makov, "[Cross-Slip and Annihilation of Screw Dislocations in Cu - A Molecular Dynamics Study](#)", *Mater. Sci. Eng. A* **400-401**, 37-39 (2005).
3. D. Mordehai, I. Kelson and G. Makov, "[Non Planer Core and Dynamical Behavior of Screw Dislocation in Copper at High Velocities](#)", *Phys. Rev. B.* **74**, 184115 (2006).
4. D. Mordehai, E. Clouet, M. Fivel, M. Verdier, "[Introducing Dislocation Climb by Bulk Diffusion in Discrete Dislocation Dynamics Simulations](#)", *Philos. Mag.*, **88**, 899-925 (2008).
5. D. Mordehai, M. Kazakevich, D. J. Srolovitz, E. Rabkin, "[Nanoindentation Size Effect in Single Crystal Nanoparticles and Thin Films: A Comparative Experimental and Simulation Study](#)", *Acta Mater.* **59**, 2309-2321 (2011).
6. D. Mordehai, S.-W. Lee, B. Backes, D. J. Srolovitz, W. D. Nix and E. Rabkin, "[Size Effect in Compression of Single-Crystal Gold Microparticles](#)", *Acta Mater.* **59**, 5202-5215.
7. S.-W. Lee, D. Mordehai, E. Rabkin and W. D. Nix, "[Effects of Focused-Ion Beam Irradiation and Pre-straining on the Mechanical Properties of FCC Au Microparticles on a Sapphire Substrate](#)", *J. Mater. Res.* **26**, 1653-1661 (2011).
8. D. Mordehai and G. Martin, "[Enhanced Annealing of the Dislocation Network under Irradiation](#)", *Phys. Rev. B.* **84**, 014115 (2011).

### **Papers Accepted**

9. D. Mordehai, E. Rabkin and D.J. Srolovitz, "Pseudoelastic Deformation During Adhesive Contacts at the Nanoscale", *Phys. Rev. Lett.* (in press).

### **Papers Submitted**

- P. Landau, D. Mordehai, A. Venkert, G. Makov, "Universal Strain-Temperature Dependence of the Dislocation Structures at the nano-scale" (submitted to *Scripta Metall.*, under review).

## **CONFERENCES**

### **Invited Talks**

"A Molecular Dynamics study of the Dynamic Properties of Dislocations in Copper", The 13<sup>th</sup> Israel Materials Engineering Conference (IMEC), Haifa, Israel, 9-10 December 2007

### **Refereed Papers in Conference Proceedings**

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "[Annealing of Dislocation Loops in Dislocation Dynamics Simulations](#)", IOP Conf. Series: Materials Science and Engineering **3**, 012001 (2009).

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Introducing Dislocation Climb in Discrete Dislocation Dynamics Simulations", CMDS-11 proc. conf., Paris, France, Eds. S. Forest & D. Jeulin, Presses des Mines, 291-296 (2008).

D. Mordehai, I. Kelson and G. Makov, "Cross-Slip in Cu - A Molecular Dynamics Study", *Mater. Res. Soc. Symp. Proc.* **882E** (2005).

D. Mordehai, I. Kelson and G. Makov, "A Molecular Dynamics and an Elastic-Continuum Study of Screw Dislocations in Copper", CMDS-10 – proc. NATO conf., Shoresh, Israel, Eds. D.J. Bergman & E. Inan, Kluwer Publ., 231-236 (2004).

### **Non-Refereed Papers in Conference Proceedings**

E. Hirsch, D. Mordehai, "Failure of Aluminum Target in Hard Steel Projectile Penetration", Proc. 21<sup>st</sup> Intl. Symp. on Ballistics (2004).

D. Mordehai and E. Hirsch, "The Problem of Two Flow Collision – A Generalized Extension of the Basic Model", Proc. 20<sup>th</sup> Int. Symp. on Ballistics Ballistics, Orlando, Florida, USA (2002).

E. Hirsch and D. Mordehai, "A Test for Measuring the Energy Density Lost in Two Flow Metallic Collision", Proc. 20<sup>th</sup> Int. Symp. on Ballistics Ballistics, Orlando, Florida, USA (2002).

E. Hirsch and D. Mordehai, "Shaped Charged Jet Break-Up Time Formula Confirmed", Proc. 19<sup>th</sup> Int. Symp. on Ballistics, Interlaken, Switzerland (2001).

D. Mordehai, U. Rokni and N. Sela, "A Systematic Hydrocode Calibration Process for Ballistic Limit Prediction", Proc. 18<sup>th</sup> Int. Symp. on Ballistics, San Antonio, Texas, USA (1999).

### **Participation in organizing conferences**

The 6<sup>th</sup> conference on Mathematical Modeling and Computer Simulation of Materials Technologies (MMT), 23-27 August 2010, Israel. **Session Chairman.**

The 5<sup>th</sup> Int. Conf. on Multiscale Materials Modeling, Freiburg, Germany, 4-8 October, 2010. **Session Chairman.**

### **Talks and Seminars in Workshops and Conferences**

#### **Seminars**

"Molecular Dynamics of Screw Dislocations in Copper", School of Physics and Astronomy, Tel Aviv University, Israel, 2 May, 2005.

"Molecular Dynamics of Screw Dislocations in Copper", Laboratoire GPM2, ENSPG, Saint Martin d'Hères, France, 9 February, 2006

"Molecular Dynamics of Screw Dislocations in Copper", Service de Recherches de Métallurgie Physique, CEA/Saclay, Gif-sur-Yvette, France, 31 Mars, 2006.

"Computational Material Study: Modelling Dislocation Climb in Dislocation Dynamics Simulations", Department of Mechanical Engineering, Ben Gurion University, 24 May 2007.

"Computational Material Study: Modelling Dislocation Climb in Dislocation Dynamics Simulations", Nuclear Research Center Negev (NRCN), 30 May 2007.

"Modeling Dislocation Climb in Discrete Dislocation Dynamics", Lille, France, 22 June 2007.

"Computational Material Study: Dislocations in the Nano- and Mesoscales", Department of Materials Engineering, Technion, Haifa, Israel, 6 December 2007.

"Molecular Dynamics Study of the Mechanical Properties of Faceted Nanoparticles", Service de Recherches de Métallurgie Physique, CEA/Saclay, Gif-sur-Yvette, France, 30 June, 2010.

### **International Contributed Talks**

D. Mordehai, I. Kelson and G. Makov, "Molecular Dynamics of Cross-slip in Copper", APS Fall Meeting, Montréal, Canada, 22-25 March, 2004.

D. Mordehai, I. Kelson and G. Makov, "The Kinematics and Dynamics of Screw Dislocations in Copper - A Molecular Dynamics Study", Dislocations 2004, La Colle-sur-Loup, France, 13-17 September, 2004.

D. Mordehai, I. Kelson and G. Makov, "Dislocation Mobility and Cross-slip in Copper - A Molecular Dynamics Study", APS Fall Meeting, Los Angeles CA, USA, 21-25 March 2005.

D. Mordehai, I. Kelson and G. Makov, "Dislocation Mobility and Cross-slip in Copper - A Molecular Dynamics Study", MRS spring meeting, San Francisco CA, USA, 28 March – 1 April, 2005.

D. Mordehai, I. Kelson and G. Makov, "Non-planar core and Dynamic emission of dislocations in fcc", Micromechanics and Microstructure Evolution, 13 Sep. 2005, Madrid.

D. Mordehai, I. Kelson and G. Makov, "Non-planar core and Dynamic emission of dislocations loops in fcc", 3<sup>rd</sup> Int. Conf. on Multiscale Materials Modeling, Freiburg, Germany, 18-22 September, 2006.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Modeling Dislocation Climb at the Mesoscopic Scale", Matériaux 2006, Dijon, France, 13-17 November 2006.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Non-planar core and Dynamic emission of dislocations loops in fcc", TMS Annual Meeting, Orlando FL, USA, 25 February – 1 March, 2007.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Modeling Dislocation Climb in Discrete Dislocation Dynamics", Plasticité 2007, Poitiers, France, 19-21 Mars, 2007.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Introducing Dislocation Climb in Discrete Dislocation Dynamics Simulations", EuroMat2007, Nürnberg, Germany, 10-13 September 2007.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Introducing Dislocation Climb in Discrete Dislocation Dynamics Simulations", MRS Fall meeting, Boston, USA, 26-30 November 2007.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Introducing Dislocation Climb by Bulk Diffusion in Discrete Dislocation Dynamics Simulations", Dislocations 2008, Honk Kong, 13-17 October, 2008.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Introducing Dislocation Climb by Bulk Diffusion in Discrete Dislocation Dynamics Simulations", TMS Annual Meeting, San Francisco CA, USA, 15-19 February, 2009.

D. Mordehai, D. J. Srolovitz, E. Rabkin, "Molecular Dynamics Study of the Mechanical Properties of Faceted Nanoparticles", TTK, Münster, Germany, 17-20 August, 2009.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Coordinated Climb of the Dislocation Network under Irradiation", 5<sup>th</sup> Int. Conf. on Multiscale Materials Modeling, Freiburg, Germany, 4-8 October, 2010.

D. Mordehai, E. Clouet, M. Fivel and M. Verdier, "Simulating the Evolution of the Dislocation Network under Irradiation", TMS "Annual Meeting, San Diego, CA, USA, 27 February – 3 March, 2011.

D. Mordehai, D. J. Srolovitz, E. Rabkin, "Plastic Deformation of Au Nanoparticles and Thin-Films: A Comparative Experimental and Simulation", TMS "Annual Meeting, San Diego, CA, USA, 27 February – 3 March, 2011.

D. Mordehai, S.-W. Lee, B. Backes, D. J. Srolovitz, W. D. Nix and E. Rabkin, "Size Effect in Compression of Single-Crystal Gold Microparticles: A Combined Experimental/Molecular Dynamics/Finite Element Study", Plasticité2011, Lille, France, 4-6 April, 2011.

### **National Contributed Talks**

D. Mordehai, I. Kelson and G. Makov, "A Molecular Dynamics Study of the Dynamics of Screw Dislocations in Copper", Atomistic and Nanoscale Simulations, Technion, Haifa, Israel, 27 January 2003

D. Mordehai, I. Kelson and G. Makov, "The Dynamics of Screw Dislocations in Copper: A Molecular Dynamics and an Elastic-Continuum Study", 10th Int. Scientific Workshop on CMDS, Shosh, Israel, 30 June - 4 July, 2003.

D. Mordehai, I. Kelson and G. Makov, "Kinematics and Dynamics of Screw Dislocations in Copper - A Molecular Dynamics Study", Israel Physical Society Conf. (IPS-2003), Bar-Ilan University, Israel, 21 December, 2003.

D. Mordehai, I. Kelson and G. Makov, "Non-planar core and Dynamic emission of dislocations in fcc", IPS 2005, 29 Dec. 2005, Israel.

D. Mordehai, D. J. Srolovitz, E. Rabkin, "Molecular Dynamics Study of the Mechanical Properties of Faceted Nanoparticles", ISCM-26, Technion, Israel, 23 April 2009.

D. Mordehai, D. J. Srolovitz, E. Rabkin, "A Size effect in Nanoindentation of Single Crystal Nanoparticles and Polycrystalline Thin-Films", The 3<sup>1st</sup> Israeli conference of Mechanical Engineering (ICME-31), 2 June 2010.

D. Mordehai, D. J. Srolovitz, E. Rabkin, "Plastic Deformation of Au Nanoparticles on a Sapphire Substrate", The 6<sup>th</sup> MMT conference, 23-27 Aug. 2010, Israel.