Michael Nastasi

ADDRESS Materials Physics and Applications
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EDUCATION B.S. Materials Science and Engineering, 1981 Cornell University, Ithaca, NY
M.S. Materials Science and Engineering, 1983 Cornell University, Ithaca, NY
Ph.D. Materials Science and Engineering, 1986 Cornell University, Ithaca, NY

PhD ADVISOR: James W. Mayer (Current position: Professor Emeritus, Arizona State University)

EXPERIENCE

2009 – Present	Director of the DOE Energy Frontier Research Center on *Materials at Irradiation and Mechanical Extremes*
2001-2009	Nano Electronics and Mechanics Thrust Leader in the *Center for Integrated Nanotechnologies (CINT),* a DOE Nanoscale Science Research Center
2000-Present	Fellow of Los Alamos National Laboratory
1996-Present	Team Leader of the Nano Science and Ion-Solid Interaction Team, Los Alamos Nat. Lab.
1993–Present	Adjunct Professor, Arizona State University, Department of Chemical, Bio, and Materials Engr
1985-1996	Staff Member, Materials Science and Technology Division, Los Alamos National Laboratory
1988 (summer)	Visiting Scholar, University of Helsinki, Department of Physics

RESEARCH INTERESTS

Ion-solid interactions, irradiation induced phase transformations, irradiation effects in nanostructured materials, ion enhanced and plasma synthesis of materials, surface mechanical properties of metastable materials and nano scale structures, materials analysis using ion beam techniques

AWARDS AND RANKINGS

1. h-index: 38 (including books)
2. Fellow of MRS (2011)
3. Awarded one of the 46 *EFRC Awards* by the DOE in 2009
4. Fellow of APS (2006)
5. Listed in the "Top 50 most published authors at LANL" in the last ten years (1996-2005) based on peer-reviewed publications, citations and patents, with a rank of 4th based on peer-reviewed publications alone
6. Los Alamos National Laboratory Fellow (2000)
7. R&D 100 Award for Plasma Source Ion Implantation for Enhancing Materials Surfaces(1997)
8. Los Alamos National Laboratory Fellows Prize for his extensive research in ion-solid interactions (1995)
9. The Department of the Navy Alan Berman Research Publication Award 1990

PROFESSIONAL ORGANIZATIONS

1. AAAS
2. APS
3 TMS
4. MRS: co-chaired three symposia, taught a short course on ion implantation, served as secretary of the New Mexico Section of the MRS, served the Society as Chair of the MRS Bulletin Editorial Board, Chair of the Book Review Board, Principle Editor for JMR, as a member of the JMR Editorial Board, and as member of the Publication Committee.
5. The Bohmisch Physical Society: Executive Officer and Treasurer

PUBLICATIONS

-Refereed publications: >490

-Books:

- Handbook of Modern Ion-Beam Materials Analysis, 2nd edition edsY. Wang and M. Nastasi, (Materials Research Society, Pittsburgh, PA, 2009).
- Ion Implantation and Synthesis of Materials, Michael Nastasi and James W. Mayer (Springer-Verlag, Berlin, 2006)
- Handbook of Modern Ion-Beam Materials Analysis, eds. J.R. Tesmer, M. Nastasi, C.J. Maggiore, J.C. Barbour, J.W. Mayer (Materials Research Society, Pittsburgh, PA, 1995).
- Ion-Solid Interactions: Fundamentals and Applications, Michael Nastasi, James K. Hirvonen, and James W. Mayer (Cambridge University Press, Cambridge, 1996).

-Edited Volumes:

- High Energy and Heavy Ion Beams in Materials Analysis, eds., J.R. Tesmer, C.J. Maggiore, M. Nastasi, J.C. Barbour, J.W. Mayer (Materials Research Society, Pittsburgh, PA 1990)
- Mechanical Properties and Deformation Behavior of Materials Having Ultra-Fine Microstructures, eds. M. Nastasi, D.M. Parkin, and H. Gleiter (Kluwer Academic Publishers, Dordrech, 1993) NATO-ASI Vol. E233
- Beam-Solid Interactions: Fundamentals and Applications, eds., M. Nastasi, N. Herbots, L.R. Harriott, and R.S. Averback, Materials Research Society Proceedings, Vol. 279. 1993.
- Proceedings of the 10th International Conference on Ion Beam Modification of Materials, eds. J.C. Barbour and M. Nastasi, Nuclear Instruments and Methods in Physical Research B127/128 (1997)
- Materials Chemistry and Physics, eds. M. Nastasi, S.S. Lau, and L.C. Feldman, (Elsevier Science S.A., Lausanne, 1996)Volume 46, numbers 2-3
- Thin-Films: Stresses and Mechanical Properties VII, eds., R.C. Cammarata, M. Nastasi, E.P. Busso, and W.C. Oliver, Materials Research Society Proceedings, Vol. 505, 1998.
- Wafer Bonding and Thinning Techniques for Materials Integration, eds: Tony E. Haynes, Ulrich M. Gosele, Michael Nastasi, and Takao Yonehara, Materials Research Society Proceedings, Volume 681E, 2001
- Proceedings of the14th International Conference on Ion Implantation Technology, 22-27 Sept. 2002, Taos, NM, USA Editors: B. Brown, T.L. Alford, M. Nastasi, and M.C. Vella, (IEEE,Piscataway, NJ, 2003)

-Book chapters and Review Articles:

- Ion Beam Analysis and Modification of Thin Film High Temperature Superconductors, M. Nastasi, in Structure-Property Relations in Ion-Beam Surface Modified Ceramics-Theory and Practice, eds. C.J. McHargue, R. Kossowsky, and W.O. Hofer (Kluwer Academic Publishers, Dordrecht, 1989) p. 477.
- Thermodynamics and Kinetics of Phase Transformations Induced by Ion Irradiation, M. Nastasi and J.W. Mayer, Materials Science Reports 6 (1991) 1.
- Ion Beam Mixing in Metallic and Semiconductor Materials, M. Nastasi and J.W. Mayer, Materials Science and Engineering Reports R12 (1994) 1.
- Ion Implantation, K.C. Walter and M. Nastasi, in Kirk-Othmer Encylcopedia of Chemical Technology, 4th edition, Volume 14 (Wiley Interscience, New York, 1995) pp. 783-814.
- M. Nastasi and G. Hubler, Ion Implantation with Beams, in the Handbook of Thin Film Process Technology, supplement 96-2, edited by D.A. Glocker and S.I. Shah (IOP, Bristol, 1996) Section E2.2

-Patents:

- US PATENT 5,458,927: Process for the formation of wear- and scuff-resistant carbon coatings, Author: Malaczynski, Gerard W. ; Qiu, Xiaohong ; Mantese, Joseph V. ; Elmoursi, Alaa A. ; Hamdi, Aboud H. ; Wood, Blake P.; Walter, Kevin C. ; Nastasi, Michael A.

- US PATENT 5,817,326: Processing of hydroxylapatite coatings on titanium alloy bone prostheses Author: Nastasi, Michael A. ; Levine, Timothy E. ; Mayer, James W.
- US PATENT 6,572,933: Forming adherent coatings using plasma processing, Nastasi, Michael A. ; Walter, Kevin C. ; Rej, Donald J.
- US PATENT 6,572,935: Optically transparent, scratch-resistant, diamond-like carbon coatings, He, Xiao Ming; Lee, Deok Hyung; Nastasi, Michael A.; Walter, Kevin C.; Tuszewski, Michel.
- US PATENT 6,572,937: Method for producing fluorinated diamond-like carbon films, Hakovirta, Marko; Nastasi, Michael A. ; Lee, Deok-Hyung ; He, Xiao-Ming.
- US Patent 7,078.108 B2: Preparation of High-Strength Nanometer Scale Twined Coating and Foil, Zhang, Xinghang: Misra, Amit; Nastasi, Michael A.; Hoagland, Richard G.

EDITOR AND EDITORIAL BOARD POSITIONS:

1. Past Member of Editorial Board of Nucl. Instrum. & Meth., Section B: Beam Interactions with Matter and Atoms
2. Past Principle Editor of the Journal of Materials Research
3. Past Chairman of MRS Bulletin Publications Subcommittee
4. Past Chairman of the Editorial Board of the MRS Bulletin
5. Past Chairman MRS Book Review Committee

CONFERENCE CHAIRS:

1. *Development in High-Temperature Superconducting Materials*, October 1 - 2, 1987, Santa Fe, NM
2. *High Energy and Heavy Ion Beams in Materials Analysis*, June 14 - 16, 1989, Albuquerque, NM
3. *Mechanical Properties and Deformation Behavior of Materials Having Ultrafine Microstructures*, NATO Advanced Study Institute, June 28- July 10, 1992, Portugal.
4. *Beam-Solid Interactions: Fundamentals & Applications*, Fall MRS, 1992.
5. *Tenth International Conference on Ion Beam Modification of Materials*, held in Albuquerque, NM, Sept. 1 - 6, 1996
6. *Thin Films: Stresses and Mechanical Properties*, MRS, December 1997
7. *Mechanical Properties of Films, Coatings and Interfacial Composites*, June 27 – July 2, 1998, Il Cicco Conference Center, Castelvecchio Pascole, Italy
8. *Wafer bonding and thinning techniques for materials integration*, Spring MRS, 2000
9. *Fourteenth International Conference on Ion Implantation Technology*, held in Taos, NM Sept 22 – 27, 2002
10. *Ion Beam and Nanomaterials*, XVIII International Materials research Congress August 16 -21, 2009, Cancún, Mexico

COMMITTEE POSITIONS:

1. Member of the Int'l Committee overseeing the International Conference Series on *Ion Beam Modification of Materials*
2. Member of the Int'l Committee overseeing the International Conference Series on *Plasma-Based Ion Implantation*

PHD STUDENTS:

1. Francois Rossi, (**Supervised PhD Dissertation research at LANL**): *Fractal Description of Collision Cascades in a Solid Under Irradiation: Application to Ion Beam Mixing*. University Claude Bernard Lyon 1, Lyon France, September 1989
2. Timothy E. Lavine (**Supervised PhD Dissertation research at LANL**): *Ion-Beam Processing of Sol-Gel Zirconia Films*. Cornell University, Ithaca New York, September 1995
3. Daniel Adams (**Provided guidance to PhD Dissertation research at ASU**): *Encapsulation of Copper Metallization by the Addition of Ti or Cr Alloys*, Arizona State University, May 1996.
4. Padma Kodali (**Supervised PhD Dissertation research at LANL**): *Mechanical and Tribological Properties of Ion Beam Process Surfaces.* University of Maryland at College Park, June 1997.

5. Raymond Verda (**Supervised PhD Dissertation research at LANL**): *The Thermal Behavior of Crystalline Silicon Coimplanted with Boron and Hydrogen*. University of California, Davis, June 2001
6. Pauli Torri (**Supervised PhD Dissertation research at LANL**): *Mechanical Properties, Stress Evolution and High-Temperature Thermal Stability o f Nnanolayered Mo-Si-N/SiC Thin Films.* University of Helsinki, Helsinki Finland, August 2001.
7. Tobias Hoechbauer (**Supervised PhD Dissertation research at LANL**): *On The Mechanisms Hydrogen Implantation Induced Silicon Surface Layer Cleavage.* University of Marburg, Marburg Germany, November 2001
8. Martin Mitan (**Provided guidance to PhD Dissertation research at ASU**): *Nanostructured Silicide Formation by Focused Ion Beam Implantation and Integration of Silver Metallization with Thin Film Silicides Layers*. Arizona State University, July 2004
9. D. Thompson (**Provided guidance to PhD Dissertation research at ASU**): *Microwave Induced Ion Cut in Silicon*, Arizona State University, April 2007
10. H. Zoo (**Provided guidance to PhD Dissertation research at ASU**): *Strain Analysis of Hydrogen Implanted Silicon*, April 2008.
11. Han Hank (**Provided guidance to PhD Dissertation research at ASU**): *Barriers on Flexible Substrates*, April 2008

SUPERVISED POSTDOCTORAL FELLOWS:

Start Date	End Date	Name	Research Title	University	Discipline
12-Jan-87	19-Dec-89	Nicole Bordes	Optimization of Substrates for Thin Film HTS	Univ. of Toulouse	Materials Science
13-Mar-89	29-Aug-90	Soumendra Basu	Irradiation Effect on High Temperature Superconductors	MIT	Materials Science
11-Apr-89	16-Mar-92	Kevin Hubbard	Ion Beam Analysis of Thin Film HTS	Yale U	Physics
05-Jun-89	25-Sep-91	Jun-Ichi Koike	Shear Instability Induced Transformations in Intermetallics	Notwesterern Univ.	Materials Science
11-Mar-91	12-Jun-92	Robert Messner	Synthesis of Nano Layered Metallic Thin Films	MIT	Materials Science
10-Feb-92	28-Apr-95	Elizabeth Cooper	Ion Mixing of Ceramic Thin Films	Northwestern Univ.	Materials Science
01-Jun-92	21-Nov-94	Harriet Kung	The Mechanical Properties of Nano Layered Thin Films	Cornell U	Materials Science
05-Apr-93	23-Feb-96	Ning Yu	Carbon nitride formation	Univ. of Houston	Physics
12-Jul-93	11-Oct-96	Ram Devanathan	The Irradiation Stability of Oxide Ceramics	Northwestern Univ.	Materials Science
07-Sep-93	30-Jan-95	Kevin Walter	Nitrogen Ion Implantation of Al alloys for Improved Tribological Properties	Univ. of Wisconsin	Materials Science
04-Apr-94	11-Aug-95	Paul McIntyer	Orientation and Microstructural Evolution in of Epitaxial Pt Films on MgO	MIT	Materials Science
22-Aug-94	09-Feb-96	Alfred Griffin	Processing-Structural-Property Relationships in Thin Films and Thin-Film Mutilayer Mateirals for Micromachines	Rice Univ.	Materials Science
23-Sep-96	21-Sep-99	Zoran	Plasma- Chemical Processing of Surfaces	Univ. of	Physics

		Falkenstein		Karsruhe	
08-Sep-97	03-Mar-00	Xiao-Ming He	Preparation of Cubic Boron Nitride Films by Plasma Source Ion Implantation	Tsinghua Univ.	Materials Science
01-Dec-97	31-Mar-99	W. Stephan Grigul	Investigation of Radiation Damage & Correlation to the Chemical Durability of Ceramic Materials with Respect to their Applicability as Nuclear Waste Forms	Technical Univ. of Dresden	Materials Science
02-Feb-98	31-Jan-00	Marko Hakoverta	Production of Hydrogen-Free Diamond -Like Films with Plasma Source Ion Implantation	Univ. of Helsinki	Physics
02-Aug-99	19-Mar-01	A. Michael Peters	"Development of Graded Interfaces for Enhanced Adhesion Using Plasma Immersi Ion Processing	Colorado School of Mines	Materials Science
09-Apr-01	23-Jun-03	J. Gregory Swadener	The Effects of Interfaces on the Physical Properties of Ferroelectric Films	Univ. of Texas-Austin	Engineering Mechanics
01-Oct-01	28-Sep-04	Ivan Afanasyev	Ion Enhanced Synthesis of Materials	Kharkiv National Univ.	Physics
07-Jan-02	04-Jan-05	Jung-Kun Lee	Ion-Cutting and Bonding of Silicon	Seoul National Univ.	Materials Science
03-Jun-02	30-Sep-05	Luiz Jacobsohn	The Influence of Alloying on the Nanostructed Atomic Arrangements in Amorphous-Carbon	Pontifical Catholic Univ. Of Brazil	Physics/ Materials Science
02-Feb-04	31-Jan-06	Lin Shao	Ion Beam Slicing With Point Defect Engineering	Univ. of Houston	Physics
04-Apr-05	31-Mar-07	Hyun Jung	Photovoltaics of Nanocrystalline TiO2	Seoul National Univ.	Materials Science

GRANTS:

- 2009 - 2014, $3,800 k/year, **Center Leader,** *Extreme Environment-Tolerant Materials via Atomic Scale Design of Interfaces*. DOE, Office of Science, Energy Frontier Research Center. Active
- 2006 – 2009, $8,000 k/year, **Thrust Leader:** *Nanoscale Electronics, Mechanics, and Systems Thrust.* The Center for Integrated Nano Technology (CINT), a DOE Office of Science Nanoscale Science Research Center. Active
- 2009– 2011, $1,300 k/year, **PI**: *Enhance Radiation Damage Resistance via Manipulation of the Properties of Nanoscale Materials.* LANL Laboratory Directed Research and Development Grant. Active.
- 1996 –Present, $350 k/year, **PI:** *Ion Enhanced Synthesis of Materials.* DOE, Office of Science. Active.
- 2005- 2007, $1,900 k, **PI:** Capital Equipment grant to purchase a high current 200 kV research ion implanter. DOE, Office of Science. Completed.

- 2004 – 2007, $220 k/year, **PI**: *Ion Beam Synthesis of Ferromagnetic Semiconductors*. LANL Laboratory Directed Research and Development Grant. Completed.
- 2004 – 2007, $240 k/year, **CO-PI**: *Exploration of the Role in Interfaces in Nanolayered Composites in Creating Radiation Damage Tolerant Material*. LANL Laboratory Directed Research and Development Grant. Completed.
- 2005 – 2007, $250 k/year, CO-PI: *Novel high-speed electro-optic switches based on domain microoptics embedded in a ferroelectric chip.* . LANL Laboratory Directed Research and Development Grant. Completed.
- 2002-2005, $240 k/year, **PI**: *Nanostructured Metals with Unusually High Fatigue Strengths.* LANL Laboratory Directed Research and Development Grant. Completed.
- 2002-2005, $1100 k/year, **PI**: *Novel Physical Behavior of Nanostructured Materials Derived from Interface Atoms.* LANL Laboratory Directed Research and Development Grant. Completed.
- 2003 -2006, $230 k/year, **CO-PI**: *Ion-Beam Synthesis and Luminescence Characterization of a New Class of Nanomaterials-Nanophoshpors.* LANL Laboratory Directed Research and Development Grant. Completed.
- 1999-2002, $225 k/year. **PI**: *Development and Engineering of the Ion-Cut and Low Temperature Direct Bonding Process*:LANL Laboratory Directed Research and Development Grant. Completed.
- 1997-1999, $1,900 k/year, **co-investigator**: *Plasma-based Processing of Materials for Motor Vehicle Components & Manufacturing Applications.* NIST Advanced Technology Program. Completed.
- 1992-1996, $ 2,500 k/year at LANL, **co-investigator**: Plasma-based Processing for the Production of Scuff Resistant Al Pistons. Cooperative Research and Development Agreement (CRADA) with General Motors. LANL portion funded by DOE Defense Programs. Completed.