

Thomas F. Juliano

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EDUCATION

Doctor of Philosophy in Materials Engineering - 2004
Drexel University, Philadelphia, PA
Graduate Advisor: Prof. Yury Gogotsi, PhD, DSc
Thesis Title: "Inducing Phase Transformations using Depth-Sensing Indentation"

Bachelor of Science in Mechanical Engineering - 2001
The University of Illinois at Chicago (UIC), Chicago, IL
Minor: Mathematics
Graduated with University Honors (4.7/5.0)

EXPERIENCE

**October 2004
To Present**

United States Army Research Laboratory, Aberdeen Proving Ground, MD
Post-Doctoral Researcher
Indentation of compliant materials, dynamic indentation tests and atomic force microscopy. Work is done primarily with both an MTS Nano Indenter as well as a Hysitron Triboscope. Projects include indentation analysis of polymer systems as well as bulk amorphous metals and developing more robust methods for measuring time-dependent properties via depth-sensing indentation. Advisor – Dr. Mark Vanlandingham

**August 2001
To September 2004**

Drexel University, Philadelphia, PA.
Graduate Research Assistant
Performed nano-indentation, micromachining tests, and Raman micro-spectroscopy analysis of samples. I managed an MTS Nano Indenter for all users, advised senior design groups and advised two students from the Illinois Mathematics and Science Academy (IMSA) in research. I co-advised two undergraduate students in work with an *in situ* Raman nano-indentation loading device and indentation of carbide derived carbon. My research concentration was on pressure induced phase transformations of silicon, PNZT and boron carbide using indentation, also ductile behavior of silicon and other semiconductors during scratching.

**September 2003
To December 2003**

Drexel University, Philadelphia, PA.
Teaching Assistant – Advanced Materials Characterization Course
Creation of tests, a lecture on nano-indentation, and personally conducting labs on atomic force microscopy, nano-indentation, and Raman spectroscopy. Discussions also included topics of IR-Raman spectroscopy, orientation imaging microscopy, and differential scanning calorimetry.

**June 2003
To August 2003**

Sandia National Laboratories, Albuquerque, NM.
Summer Intern
The project I worked on examined the response of 95/5 PNZT of varying PbO content to nano indentation. Phase transition (ferroelectric to antiferroelectric) presence in the material as well as variance of mechanical properties at different surface locations was paid special attention to. Berkovich and spherical indentation was used to indent several grains or a single grain of PNZT with both an MTS Nano Indenter and Hysitron Tribo Indenter. Raman microspectroscopy, XRD, SEM, OIM, and CSM nano indentation data were used as analysis tools. Advisor – Dr. Thomas Buchheit

**September 2002
To December 2002**

Drexel University, Philadelphia, PA.
Teaching Assistant – Advanced Materials Characterization Course
Responsibilities included frequent interaction with students, creating tests, and grading of presentations, laboratory reports, and tests. Experience has been gained in leading labs and discussions on nano-indentation, Raman spectroscopy, orientation imaging microscopy, differential scanning calorimetry, and atomic force microscopy.

**August 2000
To July 2001**

University of Illinois at Chicago, Chicago, IL.
Undergraduate Research Assistant
Performing motion control analysis at the sub-micron level, Raman analysis on machined silicon surfaces, working with computerized systems, advising high school students, and conferring frequently with graduate students. Advisors – Prof. Yury Gogotsi of Drexel University and Prof. Sabri Cetinkunt of UIC.

**May 2000
To August 2000**

Thatcher Tubes, Woodstock, IL.
Intern

Interaction with other engineers, performing design work with AutoCad R14, working with mechanical drawings, understanding mechanical processes, performing research and safety engineering.

**MEMBERSHIP
AFFILIATIONS**

The Materials Society, 2003 to Present
The American Society of Materials, 2003 to Present
The American Ceramics Society, 2003 to Present
Materials Research Society, 2001 to Present
American Society of Mechanical Engineers, 1999 to Present
Tau Beta Pi Engineering Honor Society, 2000 - Present
Phi Kappa Phi National Honor Society, 2000 - Present
UIC Alpha Sigma Chapter of Pi Tau Sigma, National Mechanical Engineering Honor Society, 1999 to Present
Golden Key National Honor Society, 1999 - Present
Phi Eta Sigma National Honor Society, 1997 - Present

HONORS/AWARDS

National Research Council Post-Doctoral Fellowship, 2004
Oak Ridge Institute of Science and Education Post-Doctoral Fellowship, 2004
Teaching Assistant Excellence Award (nominated by faculty and students) - Drexel University, 2004
Session Chair for Non-Oxide Ceramics Symposium – 5th International Meeting of Pacific Rim Ceramic Societies, Nagoya, Japan, October 2003
Travel Fellowship from American Ceramics Society to 5th International Meeting of Pacific Rim Ceramic Societies, September 29 – October 2, 2003, Nagoya, Japan
America's Registry of Outstanding Professionals, 2003
National Defense Science and Engineering Graduate Fellowship, 2002
National Science Foundation Graduate Fellowship Honorable Mention, 2002
Nominated for and Member of United States Achievement Academy, 2002
George Hill Endowed Fellowship – Drexel University, 2001
University Fellowship – University of Illinois at Chicago, 2001
Graduate Student Fellowship - University of Michigan at Ann Arbor, 2001
Arlene F. Norsym Award (UIC) – Senior design project titled *Variable Boost System* voted "Best Project" by participants of the engineering expo, out of about 70 projects, 2001
Recipient of Illinois Society of Professional Engineers Scholarship, 2000
Nominated for and Mentioned in The National Dean's List Annual Book, 2000 and 2001

ACTIVITIES

Valley Forge Middle School Visit – Drexel Engineering Awareness, April 15, 2004
Cofounder of Drexel University Student Chapter of the Materials Research Society and Vice President, 2003-4
Organizer/Moderator of Nano Indentation Short Symposium at Drexel University, May 15, 2003
Treasurer of MAGNET – Drexel Materials Graduate Society, 2002-3
Served as Mentor for Two IMSA Students during Two-Week Concentrated Mentorship Program at Drexel, July 15-26, 2002
Engineering Orientation Teaching Assistant (UIC), 2001
Cofounder of UIC Alpha Sigma Chapter of Pi Tau Sigma National Mechanical Engineering Honor Society - 1999
Positions Held: President 2000-01, Vice President 2000
Founded the "Pi Tau Sigma Leadership and Service Scholarship" at UIC in 2001
Professional Tutor In High School Mathematics, Avid Guitar Player

PUBLICATIONS

M. Vanlandingham, T. Juliano and M. Hagon, Aspects of Tip Shape Characterization for Nanoindentation of Compliant Materials, *Materials Research Society Symposium Proceedings* (2004).

T. Juliano, V. Domnich and Y. Gogotsi, Examining Pressure-Induced Phase Transformations in Silicon by Spherical Indentation and Raman Spectroscopy: A Statistical Study, *Journal of Materials Research*, **19** (10), 3099-3108 (2004).

D. Ge, V. Domnich, T. Juliano, E. Stach and Y. Gogotsi, Structural Damage in Boron Carbide under Contact Loading, *Acta Materialia*, **53** (13), 3921-7 (2004).

T. Juliano, V. Domnich, T. Buchheit, and Y. Gogotsi, Numerical Derivative Analysis of Load-Displacement Curves in Depth-Sensing Indentation, *Materials Research Society Symposium Proceedings*, **791**, Q7.5.1-11 (2004).

T. Juliano, V. Domnich and Y. Gogotsi, Chapter 5.4: Phase Transformations Under Dynamic Loading, in *High Pressure Surface Science and Engineering*, edited by Y. Gogotsi and V. Domnich, p. 521-40 (Institute of Physics Publishing, London, 2004).

T. Juliano, Y. Gogotsi, V. Domnich, The Effect of Indentation Unloading Conditions on the Phase Transformation Induced Events in Silicon, *Journal of Materials Research*, **18** (5), 1192-1201 (2003).

Y. Gogotsi and T. Juliano, Ductile Cutting of Silicon Wafers Using A Single Point Diamond Turning Machine And Raman Micro Spectroscopy Studies, in *Proc. Of the NSF Design & Manufacturing Research Conference*, January 7-10, 2002, San Juan, Puerto Rico (CD).

PRESENTATIONS AND CONFERENCES

Materials Research Society Fall 2004 Meeting – Talk Presented: T. Juliano, V. Domnich and Y. Gogotsi, Spherical Depth-Sensing Indentation on Silicon and Phase Transformation Pressure Dependence on Unloading Rate and Maximum Applied Load, November 29-December 3, 2004, Boston, MA.

Materials Research Society Fall 2004 Meeting – Poster Presented: M. Vanlandingham, T. Juliano and M. Hagon, Aspects of Tip Shape Characterization for Nanoindentation of Compliant Materials, November 29-December 3, 2004, Boston, MA.

High Pressure Phase Transformations Workshop – Invited talk presented: T. Juliano, T. Buchheit, S. Kalinin, C. Watson, J. Shin and Y. Gogotsi, Using Depth-Sensing Indentation to Induce Phase Transformations in Lead Zirconate Titanate, August 16-17, 2004, Raleigh, NC.

11th International Conference on High Pressure Semiconductor Physics – Poster presented: V. Domnich, D. Ge, T. Juliano and Y. Gogotsi, Amorphization of Boron Carbide Under Contact Loading, August 2-5, 2004, San Francisco, CA. (won best poster award)

National Institute of Standards and Technology – Invited talk presented: T. Juliano and Y. Gogotsi, Detecting Solid Phase Transformations During Localized Contact Loading Using Depth-Sensing Indentation and Raman Spectroscopy, March 24, 2004, Gaithersburg, MD.

Army Research Laboratory – Invited talk presented: T. Juliano and Y. Gogotsi, Detecting Solid Phase Transformations During Localized Contact Loading Using Depth-Sensing Indentation and Raman Spectroscopy, March 7, 2004, Aberdeen, MD.

Materials Research Society Fall 2003 Meeting – Talk presented: T. Juliano, V. Domnich, T. Buchheit, and Y. Gogotsi, Numerical Derivative Analysis of Load-Displacement Curves in Nano Indentation, December 1-5, 2003, Boston, MA.

Materials Research Society Fall 2003 Meeting – Poster presented: T. Juliano, T. Buchheit, C. Watson, and Y. Gogotsi, Response of PNZT to Sharp and Blunt Indentation, December 1-5, 2003, Boston, MA.

The 15th Annual Rio Grande Symposium on Advanced Materials – Talk presented: T. Juliano, T. Buchheit, and C. Watson, Evaluating the Response of 95/5 PNZT to Instrumented Indentation, October 28, 2003, Albuquerque, NM.

The 5th International Meeting of Pacific Rim Ceramic Societies – Talk presented: T. Juliano, V. Domnich, D. Ge, and Y. Gogotsi, Finding the Failure Mechanisms in Boron Carbide Single Crystals using Indentation, Raman Spectroscopy, and TEM Analysis, October 2, 2003, Nagoya, Japan.

Drexel University PhD Proposal Seminar – Talk presented: Detecting Phase Transformations in Materials During Localized Contact Loading, September 23, 2003, Philadelphia, PA.

Sandia Eighth Annual Technical Student Symposium – Talk presented: T. Juliano, T. Buchheit, C. Watson and Y. Gogotsi, Evaluating the Response of 95/5 PNZT to Indentation, August 5, 2003, Albuquerque, NM.

Nano Indentation Short Symposium at Drexel University – Talks presented: T. Juliano and V. Domnich, Introduction to Nano Indentation and T. Juliano, Y. Gogotsi and V. Domnich, Statistical Analysis of Indentations, May 15, 2003, Philadelphia, PA.

Drexel University Research Day – Poster presented: T. Juliano, V. Domnich, D. Ge, E. Hackett, Y. Gogotsi, Boron Carbide for Armor Applications: Indentation, Raman, and TEM Studies, April 22, 2003, Philadelphia, PA.

American Society of Materials Liberty Bell Chapter Meeting – Poster presented: T. Juliano, V. Domnich, D. Ge, E. Hackett, Y. Gogotsi, Boron Carbide for Armor Applications: Indentation, Raman, and TEM Studies, April 10, 2003, Willow Grove, PA (won 2nd place out of over 20 posters).

Drexel University Graduate Seminar – Talk presented: Silicon Processing: From Sand to Wafer, March 6, 2003, Philadelphia, PA.

Materials Research Society Fall 2002 Meeting – Talk presented: T. Juliano, Y. Gogotsi, V. Domnich, Statistical Analysis of Events in Silicon Unloading Curves During Nano Indentation, December 2-6, 2002, Boston, MA.

Materials Research Society Fall 2002 Meeting – Poster presented: T. Juliano, Y. Gogotsi, V. Domnich, Ductile Regime Machining of Silicon: Methods and Applications, December 2-6, 2002, Boston, MA.

3rd Annual Nano Indenter User's Group Meeting – Talk presented: T. Juliano, Y. Gogotsi, V. Domnich, Statistical Treatment of Events in Silicon Unloading Curves During Nano Indentation, August 19, 2002, Las Vegas, NV.

Drexel University Research Day – Posters presented: T. Juliano, Y. Gogotsi, D. Penrose, V. Domnich, Ductile Regime Machining of Silicon: Methods and Applications (scored in top 25% of judge's scores from 300 posters presented), and a Dean's Award winning poster (two given out of about 50 posters) by a senior design team that I advised: M. Dirkmaat, R. Marquiss, K. Riley, P. Shah, T. Juliano, Y. Gogotsi, Micro Material Testing Device, May 7, 2002, Philadelphia, PA.

Materials Research Society MEMS Materials Issues Workshop – Poster of joint work with Gennum Corporation presented: M. Capanu, A. Cervin-Lawry, T. Juliano, Y. Gogotsi, Thermomechanical Characterization of Thin Films for MEMS, Based on Wafer Curvature (Disk Method) and Nanoindentation Techniques, *Materials Research Society MEMS Materials Issues Workshop Proc.*, April 5-6, 2002, San Francisco, CA.

American Association for the Advancement of Science (AAAS) 2002 Annual Meeting – Poster of work done by IMSA student who I advised presented: M.A. Meneses, T. Juliano, Y. Gogotsi Mechanism of Ductile Regime Machining of Silicon, *AAAS Annual Meeting and Science Innovation Exposition*, February 14-19, 2002, Boston, MA.

Materials Research Society Fall 2001 Meeting – Poster Presented: T. Juliano, Y. Gogotsi, V. Domnich, S. Cetinkunt, N. Bopearatchy, Ductile Micromachining of Silicon for MEMS Applications, November 26-30, 2001, Boston, MA.

REFERENCES

Available by request