

Sandip Basu

333 North Avenue
Apt. 54B
Secane, PA 19018
email: sandip.basu@drexel.edu
Phone: 267 307 5114

Education:

Ph.D., Materials Science and Engineering, Drexel University, Philadelphia, PA, expected date of graduation: 2007

Advisor: Prof. Michel W. Barsoum

Thesis Title: Nano-mechanical behavior of hexagonal materials and nonlinear elastic deformation

2002

M. Tech (M.S.), Ceramic Engineering, Institute of Technology, Banaras Hindu University, India

Advisor: Prof. Om Parkash

Thesis Title: Effect of glass infiltration on the dielectric behavior of valence compensated $\text{Sr}_{0.65}\text{La}_{0.35}\text{Ti}_{0.65}\text{Co}_{0.35}\text{O}_3$

2000

B.S., Ceramic Technology, College of Ceramic Technology, University of Calcutta, India

Project Title: Effect of additives in the chemical evolution and mechanical properties of concrete

Awards and Honors:

1. Best poster award; 107th annual meeting of American Ceramic Society, Baltimore, April 2005.
2. Poster award; 29th International conference on advanced ceramics and composites, American Ceramic Society, Cocoa Beach, Florida, January 2005.
3. First place; ASM Liberty Bell Chapter poster competition, May 2004.
4. Dean's Award; Research Day poster competition at Drexel University, April 2004.
5. 2nd rank in M. Tech (M.S.) among all the graduate students in IT-BHU, India, June 2002.
6. Prestigious national scholarship from University Grants Commission, India for pursuing graduate studies during the M. Tech (M.S.), August 2000.

Patents:

1. Smart sensor based on nonlinear elasticity and ultrasound attenuation technique for structural health monitoring, S. Basu, A. Zhou, P. Finkel and M. W. Barsoum, Drexel University, disclosure submitted.
2. Method for determining the zero-contact point in indentation experiments, A. Moseson, S. Basu and M. W. Barsoum, Drexel University, disclosure submitted.

Employment Experience:

2003-2007

Graduate Research Assistant, Drexel University, Philadelphia, PA

Research Experience:

- Developed a systematic method to convert indentation load-displacement measurements to indentation stress-strain.
- Developed a method to determine zero-contact point in nanoindentation experiments.
- Characterized elastic plastic transition in different crystal structures.
- Developed a microscale model for dislocation-based nonlinear elastic deformation in materials.
- Characterized the effect of nonlinear elastic deformation on creep, fatigue and tribological properties of materials.
- Synthesized ternary carbide materials using pressurized sintering.

Instrumentation Experience:

- Nanoindenter
- Scanning electron microscope (SEM)
- Atomic force microscope (AFM)
- Uniaxial compression/tensile machine
- Atmosphere controlled furnace
- Hot isostatic press (HIP)

Supervision Experience:

- Supervised one graduate student on a project involving nanoscale mechanical characterization of metals by using spherical nanoindentation.
- Supervised three undergraduate students with a project on lateral force microscopy (by AFM) of graphite, mica and ternary MAX-phase compounds.

2002-2003

Technology Associate, Sapien Corporation, Gurgaon, India

Development Experience:

- Worked, as a software developer, technical analyst, and software administrator, for developing the booking engine, content management system and the business requirements of Opodo, a consortium of several big airlines in Europe.
- Implemented the technical designs using various web technologies.

2000-2002

Graduate Research Assistant, Institute of Technology, BHU, India

Research Experience:

- Synthesized valence compensated SrTiO₃ based barrier layer capacitor material.
- Characterized the effect of low melting conductive glass infiltration, in the grain boundaries, on the dielectric properties.
- Characterized the effect of heating/cooling schedules, on the dielectric properties.

Instrumentation Experience:

- Atmosphere controlled furnace
- X-ray diffractometer
- Scanning electron microscope (SEM)
- Impedance spectroscopy (LCR bridge)

1999

Engineering Intern, Steel Authority of India Limited, India

Internship Experience:

- Studied all the aspects of application of ceramics in different departments of a steel plant.
- Worked in a group of engineers from various disciplines and completed a development project on coke-oven refractory lining.

Academic and Professional Interests:

- Better understand the physical mechanisms in materials at micro and nano scale.
- Understand the relationships between mechanical deformation and other physical phenomena in materials.
- Successfully transfer the knowledge in development of micro or nano scale devices.
- Learn and grow in a highly motivated and research oriented organization.
- Share the knowledge with the community in form of teaching, publications and conference presentations.

Publications:

1. Kinking nonlinear elasticity in metals, A. Zhou, S. Basu and M. W. Barsoum, *Acta Mater.*, accepted for publication (2007).
2. Indirect observation of reversible dislocation motion in LiNbO₃ single crystal, S. Basu, A. Zhou and M. W. Barsoum, submitted for publication (2007).
3. Deformation micromechanisms of ZnO single crystals as determined from spherical nanoindentation stress-strain curves, S. Basu and M. W. Barsoum, *J. Mater. Res.* 22, 2470-2477 (2007).
4. Spherical nanoindentation and deformation mechanisms in free-standing GaN films, S. Basu, A. D. Williams, T. D. Moustakas and M. W. Barsoum, *J. App. Phys.* 101, 083522 (2007).
5. On the determination of spherical nanoindentation stress-strain curves, S. Basu, A. Moseson, and M. W. Barsoum, *J. Mater. Res.* 21, 2628-2637 (2006).
6. Sapphire – A kinking nonlinear elastic solid, S. Basu, M. W. Barsoum, and S. R. Kalidindi, *J. App. Phys.* 99, 063501 (2006).
7. Incipient and regular kink bands in fully dense and 10vol% porous Ti₂AlC, A. G. Zhou, M. W. Barsoum, S. Basu, S. R. Kalidindi, and T. El-Raghy, *Acta Mater.* 54, 1631-1639 (2006).
8. Microscale modeling of kinking nonlinear elastic solids, M. W. Barsoum, T. Zhen, A. Zhou, S. Basu, and S. R. Kalidindi, *Physical Review B* 71, 134101 (2005).

Presentations:

Invited:

1. Spherical nanoindentation, kinking nonlinear elasticity and MAX phases, Hysitron Inc., Minneapolis, MN, February 2007.
2. Kinking nonlinear elasticity in MAX phases, graphite and mica, Army Research Laboratory, Aberdeen, MD, April 2005.

Oral:

1. Spherical nanoindentation study on the effect of c/a ratio on nonlinear deformation behavior of Ti_3AlC_2 and Ti_2AlC , S. Basu, A. Zhou and M. W. Barsoum, 31st international conference on advanced ceramics and composites, American Ceramic Society, January 2007, Daytona Beach, FL, USA.
2. Nano-mechanical characterization of ZnO single crystals, S. Basu, M. W. Barsoum, and S. R. Kalidindi, MRS Fall Meeting, November 2005, Boston, MA, USA.
3. Spherical nanoindentations and kink bands: model and experiments, S. Basu, M. W. Barsoum, and S. R. Kalidindi, 107th Annual meeting, American Ceramic Society, April 2005, Baltimore, MD, USA.
4. Spherical Nanoindentations in Sapphire Single Crystals, S. Basu, A. Murugaiah, Z. M. Sun, S. R. Kalidindi, and M. W. Barsoum, 29th international conference on advanced ceramics and composites, American Ceramic Society, January 2005, Cocoa Beach, FL, USA.
5. Spherical Nanoindentations in Mica, Graphite and Sapphire, S. Basu, A. Murugaiah, M. W. Barsoum, Z. M. Sun, S. R. Kalidindi, and Y. Gogotsi, MRS Fall Meeting, November 2004, Boston, MA, USA.

Poster:

1. Kinking nonlinear elastic deformation under spherical nanoindentation, S. Basu, A. Zhou, M. W. Barsoum, Y. Gogotsi and S. R. Kalidindi, Gordon Research Conference, Solid state studies in ceramics, August 2006, Andover, NH, USA.
2. Spherical nanoindentation and deformation by kinking, S. Basu, A. Zhou, M. W. Barsoum, and S. R. Kalidindi, 30th international conference on advanced ceramics and composites, American Ceramic Society, January 2006, Cocoa Beach, FL, USA.
3. Spherical nanoindentation and deformation mechanisms in sapphire and rutile single crystals, S. Basu, A. Murugaiah, Z. M. Sun, S. R. Kalidindi, and M. W. Barsoum, Gordon Research Conference, Solid state studies in ceramics, July 2005, Tilton, NH, USA.
4. Spherical nanoindentation in sapphire and rutile single crystals, S. Basu, A. Murugaiah, Z. M. Sun, S. R. Kalidindi, and M. W. Barsoum, 107th Annual meeting, American Ceramic Society, April 2005, Baltimore, MD, USA.
5. Kinking Nonlinear Elastic Solids and Spherical Nanoindentations, M. W. Barsoum, A. Murugaiah, T. Zhen, S. Basu, and S. R. Kalidindi, MRS Fall Meeting, November 2004, Boston, MA, USA.

Professional Affiliations:

- Student member of American Ceramic Society, Materials Research Society, ASM and TMS.
- Reviewer for Materials Research Society proceedings.
- Reviewer for Acta Materialia.
- Reviewer for Journal of Applied Physics.
- Sports secretary for the Indian graduate students' association at Drexel University, 2004-2005.

Computer Proficiency:

C, C++, Java, Microsoft Windows platform, MS Office suite, Maple, ABAQUS (beginner).

Creative Activities:

Photography, Drawing, Learning new software and methods.

Other Interests:

Soccer, Badminton, Hiking.

References:

1. Dr. Michel W. Barsoum
Distinguished Professor
Department of Materials Science and Engineering
Drexel University
3141 Chestnut Street
Lebow 344
Philadelphia, PA 19104
Ph: 215 895 2338
email: barsoumw@drexel.edu

2. Dr. Yury Gogotsi
Professor
Department of Materials Science and Engineering
Drexel University
3141 Chestnut Street
CAT 383
Philadelphia, PA 19104
Ph: 215 895 6446
email: gogotsi@drexel.edu

3. Dr. Miladin Radovic
Assistant Professor
Department of Mechanical Engineering
Texas A&M University
127 Engineering Physics Building
3123-TAMU
College Station, TX 77843
Ph: 979 845 5114
email: mradovic@tamu.edu