

VIKAS TOMAR

ADDRESS PURDUE UNIVERSITY

School of Aeronautics and Astronautics
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CURRENT POSITION

- **Assistant Professor**, School of Aeronautics and Astronautics, Purdue University, West Lafayette-IN, 47906, **From August, 2009**
 - Microstructure and nanostructure dependent mechanical and thermal behavior of ceramic matrix composites
 - Understanding failure in nanostructured bio-motivated polymer matrix composites
 - Photomechanics of bioactive materials
 - Atomistic and continuum methods and schemes to analyze new materials such as nanowires, nanobelts, nanorods etc. in multifunctional environments at experimental length- and time-scales

HIGHER EDUCATION

- **Georgia Institute of Technology, Atlanta, Georgia, USA**
 - **Doctor of Philosophy** in Mechanical Engineering, December, 2005
 - **Major:** Mechanics of Materials **Minor:** Dynamics
 - **Dissertation:** Atomistic modeling of the Al and Fe₂O₃ material system using classical molecular dynamics
 - **Other Significant Projects:** Deterministic and stochastic micromechanical finite element analyses of dynamic fracture in two phase ceramic composites
- **Indian Institute of Technology, Madras, India and Institute B für Mechanik, University of Stuttgart, Germany**
 - **Master of Technology** in Mechanical Engineering, March 2001
 - **Major:** Machine dynamics **Minor:** Machine Design
 - **Thesis:** Investigations on 3-dimensional frictional contact dynamics in multi-body systems
- **National Institute of Technology, Kurukshetra, India**
 - **Bachelor of Technology** in Mechanical Engineering, June 1998
 - Research work on computer aided maintenance planning and implementation in process industries

NOTED ACTIVITIES AND RECOGNITIONS AS A FACULTY MEMBER

- TMS Early Career Faculty Fellow-Certificate of Distinction (2009)
- Air Force Office of Scientific Research (AFoSR) Young Investigator Award, 2009-2012
- Member editorial board “International Journal of Experimental and Computational Biomechanics”
- Panel Reviewer NSF and DoE-BES proposals

NOTED ACTIVITIES AND RECOGNITIONS DURING STUDENT YEARS

- Nano-Science and Technology (NaST) fellowship (2003-2004) recipient at the Georgia Institute of Technology, Atlanta, GA, USA
- Woodruff Fellowship for the highest score in mechanical engineering PhD qualifying exams (Spring 2002) at the Georgia Institute of Technology, Atlanta, GA, USA
- Conference travel awards to *USNCTAM-XIV* (Blacksburg, VA-USA, June-2002), APS-Topical Group Meetings (2003, 2005), and WCCM-2008 (Venice-Italy) to present research work
- Fellowships for highest scores in mechanical engineering graduate program and applied mechanics graduate program at the Indian Institute of Technology (IIT)-Chennai, Madras, India (2001)
- Deutscher Akademischer Austauschdienst (DAAD) fellowship award by the Federal Republic of Germany for graduate level research work (2000-2001)
- Fellowship at IIT-Chennai for scoring 99.54 percentile in Graduate aptitude test in engineering, (GATE-1999) for graduate engineers, (All India rank - 38 (Mechanical Engineering)), India
- Best academic score fellowship and HMT gold medal winner for being first in class in mechanical engineering undergraduate program at National Institute of Technology (NIT) - Kurukshetra, India
- National scholarship award for years 1992 and 1994 for academic excellence, India

BOOK, BOOK CHAPTERS, EDITED JOURNAL SPECIAL ISSUES, AND PROCEEDINGS

1. **Vikas Tomar**, “Molecular Modeling of Al-Fe₂O₃ Nanomaterial System”, VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG, **2009, ISBN 978-3-639-15858-8 (Book)**
2. **co-Editor: 2008 Materials Research Society (MRS) Symposia Proceedings, Vol. 1083E** for symposium R “**Coupled Mechanical, Electrical, and Thermal Behaviors of Nanomaterials**” of MRS spring meeting San-Francisco, March 24-28, 2008, **All Editors: Li Shi, Vikas Tomar, Min-Feng Yu, Min Zhou (Edited Volume)**
3. **Invited Special Issue Guest Editor: 2007-2008 “Special Issue on Multiscale Modeling”**, Mechanics Research Communications, **Vol 35/1-2, pp. 1-134. (Edited Journal Special Issue)**
4. Liang, W., **Tomar, V.** and Zhou, M., **2003**, Modeling and simulation of the mechanical response of nanowires, in *Nanowires: Synthesis, Properties and Novel Devices*, Vol.-1, pp.125-155, edited by Z.L. Wang, Kluwer Academic/Plenum Publishers. **(Book Chapter)**

REFEREED PUBLICATIONS

PUBLISHED/ACCEPTED ARCHIVAL JOURNAL PAPERS

1. Dubey, D. K., and **Tomar, V.**, **2009**, Understanding the influence of structural hierarchy and its coupling with chemical environment on the strength of idealized tropocollagen-hydroxyapatite biomaterials, *to Appear in the Journal of the Mechanics and Physics of Solids*
2. **Tomar, V.**, Samvedi, V., and Kim, H., **2009**, Atomistic understanding of the particle clustering and particle size effect on the room temperature strength of SiC-Si₃N₄ nanocomposites *to Appear in Int. J. Multiscale Comp. Engg. special issue on Advances In Computational Materials Science*
3. Dubey, D. K., and **Tomar, V.**, **2009**, Effect of Changes in Tropocollagen Residue Sequence and Hydroxyapatite Mineral Texture on the Nanoscale Strength of Ideal Tropocollagen-Hydroxyapatite Biomaterials, *to Appear in Journal of Materials Science-Materials in Medicine*

4. Dubey, D. K., and **Tomar, V., 2009**, Effect of Loading Directionality on the Mechanical Behavior of Ideal Tropocollagen-Hydroxyapatite Biomaterials with Molecularly Motivated Construction, *to Appear in the Journal of Computational and Theoretical Nanoscience*
5. Gan, M, Cerrone, A, Samvedi, V, and **Tomar, V., 2009**, Effect of microscale compression on nanoscale elastic properties of trabecular bone, *to Appear in the Experimental Mechanics*
6. Samvedi, V, and **Tomar, V., 2009**, Role of interface thermal boundary resistance in overall thermal conductivity of Si-Ge multi-layered structures, *To Appear in Nanotechnology (Special Mention by Editors and Reviewers)*
7. Dubey, D. K., and **Tomar, V., 2009**, Role of hydroxyapatite crystal shape in nanoscale mechanical behavior of model tropocollagen–hydroxyapatite hard biomaterials, *Materials Science and Engineering C*, doi:10.1016/j.msec.2009.04.015
8. Dubey, D. K., and **Tomar, V., 2009**, Role of the nanoscale interfacial arrangement in mechanical strength of tropocollagen-hydroxyapatite based hard biomaterials, *Acta Biomaterialia*, doi:10.1016/j.actbio.2009.02.035
9. Dubey, D. K., and **Tomar, V., 2009**, Effect of tensile and compressive loading on hierarchical strength of idealized tropocollagen-hydroxyapatite biomaterials as a function of chemical environment, *Journal of Physics: Condensed Matter*, Vol 21, 205103 (13 pp)
10. **Tomar, V., 2009**, Insights into the effects of tensile and compressive loadings on microstructure dependent fracture of trabecular bone, *Engineering Fracture Mechanics*, Vol 76, Issue 7, pp 884-897
11. **Tomar, V.,** and Samvedi, V, **2009**, Atomistic simulations based understanding of the mechanism behind the role of second phase SiC particles in fracture resistance of SiC-Si₃N₄ nanocomposites, *to Appear in International Journal of Multiscale Computational Engineering*
12. **Samvedi, V,** and **Tomar, V., 2008**, Role of heat flow direction, monolayer film thickness, and periodicity in controlling thermal conductivity of a Si-Ge superlattice system, *Journal of Applied Physics (featured in Virtual Journal of Nanoscale Science and Technology)*, vol **105**, 013541
13. **Tomar, V., 2008**, Analyses of the role of grain boundaries in mesoscale dynamic fracture resistance of SiC-Si₃N₄ intergranular nanocomposites, *Engineering Fracture Mechanics*, vol. 75, 4501-4512.
14. Mejia-Rodriguez, G., Renaud, J.E., and **Tomar V., 2008**, A variable fidelity model management framework for designing multiphase materials, *ASME J. Mech. Design*, vol. 130, 091702-1
15. **Tomar, V., 2008**, Analyses of the role of the second phase SiC particles in microstructure dependent fracture resistance variation of SiC-Si₃N₄ nanocomposites, *Modelling Simul. Mater. Sci. Eng.* 16 (2008) 035001.
16. **Tomar, V., 2007**, Nanomechanical analyses of nanocrystalline Ni using accelerated molecular timesteps, *Physica Status Solidi-a*, vol. **204 (10)**, pp. 3340-3348.
17. **Tomar, V.** and Zhou, M., **2007**, Analyses of tensile deformation of nanocrystalline α -Fe₂O₃+fcc-Al composites using classical molecular dynamics, *Journal of the Mechanics and Physics of Solids*, Vol. 55, pp 1053-1085
18. **Tomar, V., 2007**, Accelerating the molecular timesteps for nanomechanical simulations: The hybrid Monte Carlo Method, *Journal of Applied Physics*, Vol. 101, pp 103512 (1-9)
19. Dubey, D. K., and **Tomar, V., 2007**, Microstructure dependent dynamic fracture analyses of trabecular bone based on nascent bone atomistic simulations, *Mechanics Research Communications-Special Issue on Multiscale Modeling Vol 35/1-2 pp 24-3.*
20. **Tomar, V., 2007**, Modeling of dynamic fracture and damage in 2-Dimensional trabecular bone microstructures using the cohesive finite element method, *ASME J. Biomechanical Engg.*, Vol. 130, P021021.

21. **Tomar, V.** and Zhou, M., **2006**, Tension-compression strength asymmetry of nanocrystalline α -Fe₂O₃+fcc-Al ceramic-metal composites, *Applied Physics Letters*, Vol. 88, pp 233107 (1-3)
22. **Tomar, V.** and Zhou, M., **2006**, Classical molecular-dynamics potential for the mechanical strength of nanocrystalline composite fcc-Al+ α -Fe₂O₃, *Physical Review B*, vol. 73, pp174116 (1-16).
23. **Tomar, V.** and Zhou, M., **2005**, Deterministic and stochastic analyses of fracture in a brittle microstructure system, *Engineering Fracture Mechanics*, Vol. 72, pp 1920-1941.
24. Zhai, J., **Tomar, V.**, and Zhou, M., **2004**, Micromechanical modeling of dynamic fracture using cohesive finite element method, *ASME Journal of Engineering Materials and Technology*, vol. **126**, pp. 179-191.
25. **Tomar, V.**, Zhai, J., and Zhou, M., **2004**, Bounds on element size in a variable stiffness cohesive finite element method, *International Journal of Numerical Methods in Engineering*, vol. **61**, pp. 1894-1920.
26. Tomar, V. and Zhou, M., **2004**, Molecular dynamics simulations of shock-induced thermite reaction, *Materials Science Forum*, Vols. 465-466, pp. 157-162.

SUBMITTED ARCHIVAL JOURNAL PAPERS

27. **Tomar, V.** and Gan, M., 2009, Temperature dependent nanomechanics of si-c-n nanocomposites with an account of particle clustering and grain boundaries, *submitted to Int. J. Hydrogen Energy*
28. Mejia-Rodriguez, G., Renaud, J.E., and **Tomar V.**, 2009, Multiobjective composite material design using the variable fidelity model management optimization framework, *Submitted to the AIAA Journal*
29. Samvedi, V., and **Tomar, V.**, 2009, Role of Straining and Morphology in Thermal Conductivity of a Set of Si-Ge Superlattices and Biomimetic Si-Ge Nanocomposites, *Submitted to Journal of Physics-D, Applied Physics*
30. Dubey, D.K., and **Tomar, V.**, 2009, Effect of osteogenesis imperfecta mutations in tropocollagen molecule on strength of biomimetic tropocollagen-hydroxyapatite nanocomposites, *Submitted to Applied Physics Letters*
31. **Tomar, V.**, Gan, M., and Kim, H., 2009, Effect of temperature and morphology on mechanical strength of Si-C-O and Si-C-N nanocomposites, *in Submission to the Journal of European Ceramic Society*

INVITED TALKS

1. **Tomar, V.**, **June 2009**, Computational and experimental multiscale investigations of thermo-mechanical strength and fracture resistance in high temperature ceramic nanocomposites, 2009 TMS-MS&T symposium on “Characterization of Metal Matrix Composite Materials”, Pittsburgh, PA
2. **Tomar, V.**, **June 2009**, Designing High Temperature Ceramics for Optimal Functionality, 2009 8th Pacific Rim Conference on Ceramic and Glass Technology (PACRIM 8), Vancouver, Canada
3. **Tomar, V.**, and Dubey, D.K., **March 1-2009**, Hierarchy correlations in atomistic mechanics of collagen hydroxyapatite biomimetic composites and its relations to bone modeling and experiments, Workshop on Interdisciplinary Biomedical Research, University of Notre Dame

4. **Samvedi, V., and Tomar, V., 2009**, Understanding morphology lessons and scaling relations in nanocrystalline materials and nanocomposites, Plasticity-2009, January 3-9, 2009, St. Thomas Islands, USA
5. **Dubey, D.K., and Tomar, V., 2009**, Hierarchical atomistic and experimental chemo-mechanics of tropocollagen-hydroxyapatite nanocomposites, Plasticity-2009, January 3-9, 2009, St. Thomas Islands, USA
6. **Tomar, V., March 10-2008**, Structure and Composition Dependent Failure of Bone: Lessons Using Molecular and Continuum Simulations, Biomechanics Research Interest Group, University of Illinois Urbana-Champaign

PUBLISHED CONFERENCE PROCEEDINGS AND CONFERENCE PRESENTATIONS

1. **Kim, H., and Tomar, V., 2009**, Understanding scaling relations in fracture and mechanical deformation of single crystal and polycrystalline silicon by performing atomistic simulations at mesoscale, USNCCM, July 16-19, 2009, Ohio State University
2. **Gan, Ming, and Tomar, V., 2009**, Role of nanoscale interface diffusion and interfacial arrangements in fracture strength and strength against creep deformation of si-c-n nanocomposites in high temperature environments, USNCCM, July 16-19, 2009, Ohio State University
3. **Samvedi, V., and Tomar, V., 2009**, Strain and length scale driven thermomechanics of Si-Ge and SiC-Si₃N₄ super lattice interfaces and nanocomposites, USNCCM, July 16-19, 2009, Ohio State University
4. **Dubey, D.K., and Tomar, V., 2009**, Hierarchy driven atomistic mechanics of collagen hydroxyapatite biomimetic composites, USNCCM, July 16-19, 2009, Ohio State University
5. **Samvedi, V., and Tomar, V., 2009**, Role of heat flow direction, monolayer film thickness, and periodicity in controlling thermal conductivity of a Si-Ge superlattice system, University of Illinois Urbana-Champaign, USA, June 1-4, 2009
6. **Dubey, D.K., and Tomar, V., 2009**, Understanding atomistic mechanics of collagen hydroxyapatite biomimetic composites, SEM Annual Conference & Exposition on Experimental and Applied Mechanics, June 1-4, 2009, Albuquerque, New Mexico USA
7. **Mejía-Rodríguez, Gilberto, Renaud, John E., and Tomar, V., 2009**, Multiobjective composite material design using the variable fidelity model management optimization framework, 2009 AIAA SDM Conference, Palm-Springs, CA
8. **Gan, M., and Tomar, V., 2009**, Role of nanoscale interface diffusion in creep deformation and microstructural stability of Si-C-N nanocomposites in high temperature environment, TMS 2009 Annual Meeting & Exhibition, San-Francisco-CA, February 15-19, 2009
9. **Samvedi, V., and Tomar, V., 2009**, Controlling thermal diffusion by manipulating nanoscale structural arrangement and doping in nanocomposites for high temperature applications, TMS 2009 Annual Meeting & Exhibition, San-Francisco-CA, February 15-19, 2009
10. **Dubey, D.K., and Tomar, V., 2009**, Functional relationship of collagen based biomimetic composites with integral cell membrane proteins, TMS 2009 Annual Meeting & Exhibition, San-Francisco-CA, February 15-19, 2009
11. **Dubey, D.K., and Tomar, V., 2009**, Hierarchy correlations in atomistic mechanics of collagen hydroxyapatite biomimetic composites, TMS 2009 Annual Meeting & Exhibition, San-Francisco-CA, February 15-19, 2009
12. **Samvedi, V., and Tomar, V., 2008**, Analyses of the effect of interfaces and grain boundaries in fracture strength and thermal conductivity of Sic-Si₃N₄ nanocomposites, ASME-IMECE-2008, October 31-November 06, Boston-MA

13. **Dubey, D.K., and Tomar, V., 2008**, Mesoscale and atomistic chemo-mechanics of nascent bone tissue: Role of interfaces and hierarchy, ASME-IMECE-2008, October 31-November 06, Boston-MA
14. **Gan, Ming, Dubey, D.K., Cerrone III, A., and Tomar, V., 2008**, Combined atomic force microscope and atomistic simulations based multiple lengthscale experiments and atomistic simulations of bone tissues, **Symposium Z: Mechanics of Biological and Biomedical Materials**, MRS Fall Meeting-2008, December 1-5, Boston-MA
15. **Cerrone, Al, and Tomar, V., 2008**, Correlation between 2-D and 3-D mesoscale dynamic fracture analyses of trabecular bone, **Symposium Z: Mechanics of Biological and Biomedical Materials**, MRS Fall Meeting-2008, December 1-5, Boston-MA
16. **Samvedi, V., and Tomar, V., 2008**, Analyses of correlations among fracture strength, thermal conductance, and the presence of grain boundaries in a ceramic nanocomposite material using cohesive finite element and molecular dynamics methods, Society of Engineering Science Meeting, October 12-15, University of Illinois, Urbana Champaign, IL
17. **Dubey, D.K., and Tomar, V., 2008**, Hierarchical chemo-mechanics of tropocollagen-hydroxyapatite nanocomposites: Role of interfaces and hierarchy, Society of Engineering Science Meeting, October 12-15, University of Illinois, Urbana Champaign, IL
18. **Gan, Ming, Dubey, D.K., Cerrone III, A., and Tomar, V., 2008**, Correlation between atomic force microscope based experiments and atomistic simulations based deformation analyses of bone tissue, Society of Engineering Science Meeting, October 12-15, University of Illinois, Urbana Champaign, IL
19. **Tomar, V., 2008**, Cohesive finite element based and fractal dimension related analyses of microstructure dependent dynamic fracture in trabecular bone, Symposium GG Talk in Materials Research Society Spring-2008 Meeting, March 24-28, San Francisco
20. **Dubey, D.K., and Tomar, V., 2008**, Chemo-mechanical analyses of nascent bone tissue using atomistic simulations, Symposium R Talk in Materials Research Society Spring-2008 Meeting, March 24-28, San Francisco
21. **Samvedi, V., and Tomar, V., 2008**, Atomistic thermomechanics of Si_3N_4 -SiC nanocomposites and Si-Ge superlattice interfaces: Thermal conduction issues in inhomogeneous structures, Symposium R Talk in Materials Research Society Spring-2008 Meeting, March 24-28, San Francisco
22. **Gan, Ming, Cerrone III, A., Dubey, D.K., and Tomar, V., 2008**, Elastic property measurements of bone tissue using atomic force microscope, nanoindentation, and atomistic simulations, Symposium GG Poster in Materials Research Society Spring-2008 Meeting, March 24-28, San Francisco
23. **Samvedi, V., and Tomar, V., 2008**, Analyses of the effect of grain boundaries in multifunctionality of Si_3N_4 -SiC nanocomposites, World Congress on Computational Mechanics, 2008, Venice-Italy
24. **Dubey, D.K., and Tomar, V., 2008**, Multiple lengthscale chemo-mechanical analyses of nascent bone tissue using atomistic simulations, Pacific Symposium on Biocomputing, Jan 4-8 2008, Big Island of Hawaii
25. **Tomar, V., 2008**, Analyses of the effect of grain boundaries in creep and dynamic fracture of polycrystalline SiC- Si_3N_4 nanocomposites, 8th International Congress on Fundamentals of Fracture, 2008, Hong Kong University of Science and Tech, Hong-Kong
26. **Tomar, V., 2007**, Dynamic fracture analyses of SiC- Si_3N_4 nanocomposites with explicit account of grain boundaries, 9th US National Congress on Computational Mechanics, University of California-Berkeley,

27. **Tomar, V., 2007**, Cohesive finite element based analyses of dynamic fracture in SiC-Si₃N₄ nanocomposites with explicit account of grain boundaries, ASME-IMECE-2007, November 12-15 2007, Washington-Seattle, USA
28. **Mejia-Rodriguez, G., Renaud, J.E., and Tomar V., 2007**, A variable fidelity model management framework for multiscale computational design of continuous fiber SiC-Si₃N₄ ceramic composites, **DETC2007-35913**, Proceedings of the ASME 2007 International Design Engineering Technical Conference, September 4-7, 2007, Las Vegas, Nevada, USA
29. **Tomar, V., 2007**, Multiscale Simulation of Dynamic Fracture in Polycrystalline SiC-Si₃N₄ Using a Molecularly Motivated Cohesive Finite Element Method, **Paper No. AIAA-2007-2345**, 48th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference (April 23-26, 2007) Honolulu, Hawaii
30. **Mejia-Rodriguez, G., Renaud, J.E., and Tomar V., 2007**, A Methodology for Multiscale Computational Design of continuous fiber SiC-Si₃N₄ ceramic composites Based on the Variable Fidelity Model Management Framework, **Paper No. AIAA-2007-1908**, 3rd AIAA Multidisciplinary Design Optimization Specialist Conference (April 23-26, 2007) Honolulu, Hawaii
31. **Tomar, V., 2007**, Fracture mechanics of architecture dependent fracture in trabecular bone using the cohesive finite element method, **SBC 2007-176072**, Proceedings of the ASME 2007 summer bioengineering conference (SBC 2007), June 20-25, Keystone resort and conference center, Keystone, Colorado, USA
32. **Dubey, D.K., and Tomar, V., 2007**, Mesoscale dynamic fracture analyses of trabecular bone, SES-2007, October 21-24, Texas A&M university, October 2007, USA
33. **Dubey, D.K., and Tomar, V., 2007**, Cohesive finite element based analyses of dynamic fracture in trabecular bone, ASME-IMECE-2007, November 12-15 2007, Washington-Seattle, USA
34. **Tomar, V. and Zhou, M., 2006**, Analyses of the Effect of Grain Size and Volume Fraction on the Hall-Petch Effect in Al+ Fe₂O₃ Nanocrystalline Composites, in 7th *WCCM*, July 16-22, Los Angeles, CA-USA.
35. **Tomar, V. and Zhou, M., December-2006**, A Characterization of the nanomechanical behavior of nanocrystalline α -Fe₂O₃+fcc-Al ceramic-metal composites using classical molecular dynamics, in *proceedings of the ICCMS-2006, the 2nd international congress on computational mechanics and simulation, December 8-10, 2006, Guwahati-India.*
36. **Tomar, V. and Zhou, M., November-2006**, Characterization of defect nucleation and propagation in Fe₂O₃+fcc-Al nanocomposites during uniaxial tensile and compressive deformations, in *proceedings of ASME-IMECE 2006 Chicago*, Illinois, publication number **IMECE2006-13629**.
37. **Tomar, V., November (27-30), 2006**, Atomistic simulations of strain rate dependent deformation behavior at continuum timescales, in *Size Effects in the Deformation of Materials — Experiments and Modeling*, edited by E. Lilleodden, P. Besser, L. Levine, A. Needleman (Mater. Res. Soc. Symp. Proc. **976E**, Warrendale, PA, 2007), *November 2006, Boston-Mass, paper number 0976-EE01-05*
38. **Tomar, V., November (27-30), 2006**, A method for analyzing nanomechanical deformation of nanocrystalline Ni at higher timesteps than is possible in classical molecular dynamics, in *Multiscale Modeling of Materials*, edited by R. Devanathan, M. J. Caturla, A. Kubota, A. Chartier, S. Phillpot (Mater. Res. Soc. Symp. Proc. **978E**, Warrendale, PA, 2007), *November 2006, Boston-Mass, paper number 271380*

39. **Tomar, V.** and Zhou, M., **December-2005**, A Study of Shock-Wave Propagation in Single Crystalline *fcc*-Al and α -Fe₂O₃ and an Interface between Two Such Phases Using MD Simulations, *in print in the proceedings of the Materials Research Society Symposia on Shock Waves, December 2005, Boston-Mass. Paper 0896-H08-03*
40. **Tomar, V.** and Zhou, M., **November-2005**, Strength analyses of Fe₂O₃+Al nanocomposites using classical molecular dynamics, in *proceedings of ASME-IMECE 2005 Orlando, Florida*, publication number **IMECE2005-79282**
41. **Tomar, V.** and Zhou, M., **March-2005**, Stochastic analysis of dynamic fracture in ceramic composite microstructures, in *proceedings of 11th international conference on fracture*, Turin, Italy
42. **Tomar, V.** and Zhou, M., **December-2005**, Molecular dynamics modeling of shock wave propagation in *fcc*-Al, α - Fe₂O₃, and their interfaces, *in print in Proceedings of the Topical Group Conference on Shock Compression of Condensed Matter by American Physical Society*, Washington, 2005
43. **Tomar, V.** and Zhou, M., **2004**, Molecular dynamics simulations for Fe₂O₃+Al nanocomposite strength analyses, at *ASME IMECE2004*, Nov. 12-16, 2004, Anaheim, CA-USA.
44. **Tomar, V.** and Zhou, M., **2004**, Molecular dynamics framework for nano-mechanics of Fe₂O₃+Al nanocomposites, at *The fifth Georgia Tech conference on nano-science and nanotechnology*, Nov. 10-11, 2004, Atlanta, GA-USA.
45. **Tomar, V.** and Zhou, M., **2004**, A molecular dynamics potential for Fe₂O₃+Al thermite mixtures, at *International conference on new models and hydrocodes for shock wave processes*, May 16-20, 2004, The Inn and Conference Center, University of Maryland, University college, College park, MD-USA.
46. **Tomar, V.** and Zhou, M., **2004**, A molecular dynamics simulation framework for an Al+Fe₂O₃ reactive metal powder mixture, in *Nanoscale Materials and Modeling—Relations Among Processing, Microstructure and Mechanical Properties*, edited by Peter M. Anderson, Timothy Foecke, Amit Misra, and Robert E. Rudd (Mater. Res. Soc. Symp. Proc. 821, Warrendale, PA), Vol.-821, pp. 319-325
47. **Tomar, V.** and Zhou, M., **2004**, An empirical molecular dynamics potential for an Al+Fe₂O₃ reactive metal powder mixture, **Paper No. AIAA 2004-1697**, in *45th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference*, 19-22 April 2004, Palm Springs, California
48. **Tomar, V.** and Zhou, M., **2003**, A cohesive finite element method for combined deterministic and stochastic analysis of microscopic dynamic fracture, at *USNCCM-VII Sandia Labs.*, New-Mexico, USA, July-2003.
49. **Tomar, V.**, Shenoy, M., Liang, W., McDowell, D.L., and Zhou, M., **2003**, Continuum fields in dynamically deforming MD atomistic particle systems, at *USNCCM-VII*, Sandia Labs., New-Mexico, USA, July-2003.
50. **Tomar, V.** and Zhou, M., **2003**, Molecular dynamics simulation of shock induced detonation, in *Shock compression of condensed matter-Proceedings of the American Physical Society Topical Group on Shock Compression of Condensed Matter 2003*, M.D. Furnish, Y.M. Gupta, J.W. Forbes (eds.), **Vol-706**, pp. 413-416.
51. **Tomar, V.** and Zhou, M., **2002**, Stochastic analysis of fracture processes at microstructural level, at *USNCTAM-XIV*, Blacksburg, VA-USA, June-2002.

OTHER PUBLICATIONS

1. Atomistic modeling of the Al and Fe₂O₃ material system using classical molecular dynamics, PhD Dissertation-December 2005, Georgia Institute of Technology, Atlanta-GA.
2. Investigation of 3-dimensional contact dynamics in rigid bodies, Master's Thesis, ZB-115, (Feb., 2001), Institute B für Mechanik, University of Stuttgart, Germany.
3. Computer aided maintenance planning (CAMP) and condition based maintenance (CBM) implementation in process industries, B. Tech. Thesis, (July, 1998), Regional Engineering College-Kurukshetra, India.

STUDENTS

POST-DOCTORAL FELLOW

Dr. Han Sung Kim (PhD: The Ohio State University)

DOCTORAL STUDENTS

In Progress:

Mr. Gilberto Mejia-Rodriguez (Begun Fall 2006, co Advisor, **Main Advisor:** Dr. John E. Renaud, Aerospace and Mechanical Engineering, University of Notre Dame)-Candidacy Defended: May 11, 2009: "Multiscale material design using the variable fidelity optimization framework"

Mr. Devendra Dubey (Begun Fall 2006, Masters Defended July 08, 2009)

Mr. Vikas Samvedi (Begun Fall 2006, Masters Defended July 09, 2009)

Mr. Ming Gan (Begun Fall 2007)

UNDERGRADUATE STUDENTS

Fall-2006

Andy Crutchfeld, Junior-AME, "Modeling heat transfer in SiC-Si₃N₄ layered micro- and nano-superlattices"

Summer-2007

Albert Cerrone, Sophomore-CE, "Setting up the Hokinson Bar experiment for measuring high strain rate properties of materials"

Alyssa Teves, Junior-AME, **NSF-REU**, "Multiscale design tool development for high performance nanocomposites"

Fall-2007 and Spring-2008

Kyle Kron, Junior-AME, "Finite Element Analyses of SiC-Si₃N₄ Nanoceramic Composites for High-Temperature Structural Applications"-**Recipient—Vincent P. Slat Fellowship by Notre Dame Energy Center**

Albert Cerrone, Junior-CE, "Coupled experiments in biological tissue mechanics"

Summer-2008

Al Cerrone, Junior-CE, "Fracture of 3-D Trabecular bone using Cohesive Finite Element Method"

Guru Velasco and Matild Dosa, Sophomore-ME, "Controlling nano-organisms for energy purposes"

Fall-2008 and Spring-2009

Al Cerrone, Senior-CE, “Fracture of 3-D Trabecular bone using Cohesive Finite Element Method”

Avery Scott, Adam Woodruff, and Mike Brundage, Juniors-ME & AE, “Understanding role of inorganic materials in interactions with biological cells”

Summer-2009

David Loughery, Center of Nanoscience and Technology, Summer Fellowship Program-NURF

Ashley Meklis, Steven Atkinson, Steven Santay, NSF REU Fellowship from the NSF-CMMI Division

RESEARCH EXPERIENECE FOR TEACHERS

Summer-2007 to Fall-2008:

Mr. Michael Lewis, West Side High School, Gary, Indiana, **NSF-RET**, “Multiscale design tool development for high performance nanocomposites”

Summer-2009:

Mr. Michael Lewis, West Side High School, Gary, Indiana, **NSF-RET**, “Experimental material tests for understanding length scale effects in material properties”

COURSES TAUGHT AT PURDUE

Fall 09: AAE 558: Finite Element Methods in Aerospace Structures

COURSES TAUGHT AT THE UNIVERSITY OF NOTRE DAME

AME 60641: Advanced Mechanics of Solids

Spring 06: Total Students-7

Fall 06: Total Students-3

Fall 08: Total Students-5

AME 20241: Mechanics of Solids

Spring 07: Total Students-61

Spring 08: Total students-37

Spring 09: Total Students-68

AME 77177: Molecular Modeling of Advanced Materials

Fall 07: Total Students-7