Curriculum Vitae: Pradeep Sharma

EDUCATION:
1990–1994
Bachelor of Science in Mechanical Engineering**,** August 1995
M.S. University of Baroda, India

1995–2000
Ph.D. in Mechanical Engineering, August 2000
University of Maryland, College Park

PROFESSIONAL ACCREDITATION:
Chartered Physicist (Ch.Phy.)---Institute of Physics, London, UK, 2003

PROFESSIONAL EXPERIENCES:
2012 - present, M.D. Anderson Professor and Department Chair, Department of Mechanical Engineering, University of Houston, TX
2008-2011, Bill Cook Endowed Associate Professor, Department of Mechanical Engineering, University of Houston, TX

2005-2008, Bill Cook Endowed Assistant Professor, Department of Mechanical Engineering, University of Houston, TX

Jan 2004-present, Assistant Professor, Department of Mechanical Engineering, University of Houston, TX

September 2000– October 2003, Research Scientist, General Electric Corp. R & D, Schenectady, NY

AWARDS AND HONORS:

(1) ONR Young Investigator Award, 2005
(2) Bill D. Cook Faculty Endowed Chair, 2005
(3) Texas Space Grants Consortium New Investigators Program Award, 2005
(4) University of Houston, Excellence in Research and Scholarship Award, Assistant Professor Level, 2006
(5) University of Houston, Cullen College of Engineering Junior Faculty Award, 2007
(6) Guest Editor: *Mathematics and Mechanics of Solids*, 2007 (special issue on size-effects in mechanics)
(7) Founding Editor: iMechanica Journal Club, 2007
(8) Selected as one of the Top Referees (2009); *Proceedings of the Royal Society*
(9) Thomas J.R. Hughes ASME Young Investigator Award[1], 2009; **Citation**: "*For outstanding contributions to understanding size-effects of coupled mechanical and physical phenomena in materials*".
(10) Faculty of the Year award by local ASME student chapter—2010
(11) University of Houston, Excellence in Research and Scholarship Award, Associate Professor Level, 2011
(12) Distinguished M.D Anderson Professorship, 2012
(13) Fulbright Award, 2013

[1] Awarded annually by the ASME to a mechanician under 40.

(14) ASME Fellow, 2013
(15) University of Houston Teaching Award, 2013
(16) ASME Melville Medal, 2015
(17) (Past) Associate Editor**:** *Journal of Theoretical and Computational Nanoscience*
(18) Associate Editor: *Journal of Applied Mechanics*
(19) Associate Editor: *Journal of the Mechanics and Physics of Solids*
(20) Editorial Board Member: *International Journal of Applied Mechanics*
(21) Editorial Board Member: *Mathematics and Mechanics of Solids*

PATENTS

(1) Monolithic light emitting devices based on wide bandgap semiconductor nanostructures and methods for making same; US Patent Issued on October 17, 2006

BOOK CHAPTER

(Invited) R. Maranganti, and **P. Sharma**, "A Review of Strain Field Calculations in Embedded Quantum Dots and Wires", Chapter 118, *Handbook of Theoretical and Computational Nanotechnology*, Michael Reith and Wolfram Schommers (eds.), 2006

SELECTED REFEREED JOURNAL PUBLICATIONS: out of 83 total; Reprints and preprints of most listed papers are available on the following website: http://sharma.me.uh.edu

ASTERIX * indicates graduate student I advised and funded. **indicates a graduate student co-advised.

1. F. Ahmadpoor*, **P. Sharma**, "Thermal fluctuations of vesicles and nonlinear curvature elasticity-implications for size-dependent renormalized bending rigidity and vesicle size distribution", *Soft Matter*, **12**, 2523-2536, 2016(*Featured as Cover Image*)
2. X. Li*, L. P. Liu, **P. Sharma**, "A new type of Maxwell stress in soft materials due to quantum mechanical-elasticity coupling", *Journal of the Mechanics of Physics of Solids*, **87**, 115-129, 2016
3. F. Ahmadpoor*, **P. Sharma**, "Flexoelectricity in two-dimensional crystalline and biological membranes", *Nanoscale*, **7**, 16555-16570, 2015
4. X. Li*, L. P. Liu, **P. Sharma**, " Geometrically nonlinear deformation and the emergent behavior of polarons in soft matter", *Soft Matter*, **11**, 8042-8047, 2015 (*Featured as Cover Image*)
5. M. Zelisko*, J. Li, **P. Sharma**, "What is the mechanism behind biological ferroelectricity?", *Extreme Mechanics Letters*, **4**, 162-174, 2015
6. A. Gouissem*, R. Sarangi*, Q. Deng, **P. Sharma,** "Bridging time-scales: Grain boundary sliding constitutive law from atomistics", *Computational Materials Science*, **104**, 200-204, 2015
7. X. Yan*, A. Gouissem*, **P. Sharma**, "Atomistic insights into Li-ion diffusion in amorphous silicon", *Mechanics of Materials*, **91**, 306-312, 2015(*Invited Paper for Special Issue on Mechanics of Energy Conversion and Storage*)
8. Y. Liu, H. Cai, M. Zelisko*, Y. Wang, J. Sun, F. Yan, F. Ma, Pwang, Q. N. Chen, H. Zheng, X. Meng, **P. Sharma**, Y. Zhang, J. Li, "Ferroelectric switching of elastin", *Proceedings of the National Academy of Sciences*, **111 (27)** ,E2780-E2786, 2014

9. M. Zelisko*, Y. Hanlumyuang, S. Yang, Y. Liu, C. Lei, J. Li, P. M. Ajayan, **P. Sharma**, “Anomalous piezoelectricity in two-dimensional graphene nitride nanosheets”, *Nature Communications*, **5:4284**, 2014
10. F. Ahmadpoor*, L. P. Liu, **P. Sharma**, “Thermal fluctuations and the minimum electrical field that can be detected by a biological membrane”, *Journal of the Mechanics of Physics of Solids*, **78**, 110-122, 2015
11. Q. Deng, L. P. Liu, **P. Sharma**, “Electrets in soft materials: Nonlinearity, size effects, and giant electromechanical coupling”, *Physical Review E*, **90**, 012603, 2014
12. Y. Hanlumyuang, X. Li*, **P. Sharma**, “Mechanical strain can switch the sign of quantum capacitance from positive to negative”, *Physical Chemistry Chemical Physics*, **16(42)**, 22962-22967, 2014
13. Q. Deng, L.P. Liu, **P. Sharma,** “Flexoelectricity in soft materials and biological membranes”, *Invited Paper for Sixtieth anniversary issue in honor of Professor Rodney Hill, Journal of the Mechanics of Physics of Solids*, **62**, 209-227, 2014
14. G. Shi, Y. Hanlumyuang, Z. Liu, Y. Gong, W. Gao, J. Lou, R. Vajtai, **P. Sharma**, P.M. Ajayan, “Boron nitride – graphene nanocapacitor and the origins of anomalous size-dependent increase of capacitance, *Nano Letters*, **14**, 1739-1744, 2014
15. Z. Alameh*, Q. Deng, L. P. Liu, P. Sharma, “Using electrets to design concurrent magnetoelectricity and piezoelectricity in soft materials”, *Journal of Materials Research*, **30**, 93-100, 2015
16. P. Mohammadi*, L.P. Liu, **P. Sharma**, “A theory of flexoelectric membranes and effective properties of heterogeneous membranes”, *Journal of Applied Mechanics*, **81**, 011007-2, 2014
17. Q. Deng, M. Kammoun, A. Erturk, **P. Sharma**, “Nanoscale flexoelectric energy harvesting”, *International Journal of Solids and Structures*, **51**, 3218-3225, 2014
18. Y. Hanlumyuang, L.P. Liu, **P. Sharma**, “Revisiting the entropic force between fluctuating biological membranes”, *Journal of the Mechanics of Physics of Solids*, **63**, 179-186, 2014
19. R. Mbarki*, N. Baccam, Kaushik Dayal, **P. Sharma**, “Piezoelectricity above the Curie temperature? Combining exoelectricity and functional grading to enable high-temperature electromechanical coupling”, *Applied Physics Letters*, **104**, 122904, 2014
20. **P. Sharma**, " Entropic force between membranes reexamined", *Proceedings of the National Academy of Sciences*, 110(6), 1976-1977, 2013
21. L.P. Liu, **P. Sharma**, " Giant and universal magneto-electric coupling in soft materials and the concomitant ramifications for materials science and biology", *Physical Review E*, 88, 040601(R), 2013
22. L.P. Liu and **P. Sharma**, “Flexoelectricity and thermal fluctuations of lipid bilayer membranes: Renormalization of flexoelectric, dielectric, and elastic properties”, *Physical Review E*, 87, 032715, 2013
23. Z. Liu, Y. Zhan, S. Moldovan, M. Gharbi*, L. Song, G. Shi, L. Ma, W. Gao, S. Zhao, J. Huang, R. Vajtai, F. Banhart, **P. Sharma**, J. Lou, P.M. Ajayan, “Anomalous High Capacitance in a Coaxial Nanowire Capacitor”, *Nature Communications*, 3:879, 2012
24. S. Chandratre***, P. Sharma**, “Coaxing Graphene to be Piezoelectric”, *Applied Physics Letters,* 100, 023114-1-023114-3, 2012
25. P. Chhapadia*, P. Mohammadi*, **P. Sharma**, “Curvature-dependent Surface Energy and Implications for Nanostructures”, *Journal of the Mechanics and Physics of Solids*, 59, 2103-2115, 2011
26. P. Mohammadi*, L.P. Liu, **P. Sharma**, R.V. Kukta, " Surface energy, elasticity and the homogenization of rough surfaces", *Journal of the Mechanics of Physics of Solids*, 61, 325-340, 2013

27. S. Dai**, M. Gharbi*, **P. Sharma**, H.S. Park, Surface Piezoelectricity, Size-effects in Nanostructures and Emergent Piezoelectricity in Non-piezoelectric Materials", *Journal of Applied Physics,* 110, 104305, 2011
28. C. Mi, D. A. Buttry, **P. Sharma**, D.A. Kouris, "Atomistic insights into dislocation-based mechanisms of void growth and coalescence", *Journal of the Mechanics and Physics of Solids,* Volume 59, Issue 9, 1858, 2011
29. R. Maranganti* and **P. Sharma** , "Revisiting Quantum Notions of Stress " , *Proceedings of Royal Society A*, 466,1097-1116, 2010
30. M. Gharbi*, Z.H. Sun, K. White, S. El-Borgi, and **P. Sharma** , "Flexoelectric properties of ferroelectrics and the nanoindentation size-effect " , *International Journal of Solids and Structures*, 48 (2011) 249-256
31. N.D.Sharma*, C.M.Landis and **P. Sharma** , "Piezoelectric Thin-Film Super Lattices Without Using Piezoelectric Materials " , *Journal of Applied Physics* , 108,024304, 2010
32. M. Gharbi*, Z.H. Sun** , **P. Sharma** , K. White, " The Origins of Electromechanical Indentation Size Effect in Ferroelectrics", *Applied Physics Letters, 95, 142901 ,2009*
33. M.S. Majdoub*, R. Maranganti*, **P. Sharma**, "Understanding the origins of the intrinsic dead layer effect in nanocapacitors", *Physical Review B*,**79**, 115412, 2009
34. R. Maranganti* and **P. Sharma**, "Atomistic Determination of Flexoelectric Properties of Crystalline Dielectrics", *Physical Review. B* 80 , 054109, 2009
35. **(Invited)** A. K. Tagantsev, V. Meunier, and **P. Sharma**, "Novel Electromechanical Phenomena at the Nanoscale: Phenomenological Theory and Atomistic Modeling", *MRS bulletin*, volume 34 , 2009
36. F. Shi*, **P. Sharma** and G.H. Gunaratne, "How To Create Perfectly Ordered Quantum Dots via Self-Assembly, *Chaos*, 19 , 033141 ,2009
37. X. Zhang*, M. Gharbi*, **P. Sharma**, and H. T. Johnson, "Quantum Field Induced Strains in Nanostructures and Prospects for Optical Actuation", *International Journal of Solids and Structures*, 46,3810–3824, 2009
38. M.S. Majdoub*, **P. Sharma** and T. Cagin, Enhanced Size-Dependent Piezoelectricity And Elasticity in Nanostructures Due to The Flexoelectric Effect", *Physical Review B***,** 77, 125424-1 – 125424-9, 2008
39. M.S. Majdoub*, **P. Sharma** and T. Cagin, "Dramatic Enhancement in Energy Harvesting For a Narrow Range of Dimensions in Piezoelectric Nanostructures", *Physical Review B***,** 78, 121407 (R), 2008
40. S. Sahoo, R. Maranganti*, S. Lastella, G. Mallick, S. Karna, **P. Sharma** and P.M. Ajayan, "Reversible Separation of Single-Walled Carbon Nanotubes in Bundles", *Applied Physics Letters,* **93**, 083120, 2008
41. F. Shi*, **P. Sharma**, D.J. Kouri, F. Hussain and G.H. Gunaratne, "Nanostructures with Long-Range Order in Monolayer Self-Assembly ", *Physical Review E*, 78, 025203, 2008
42. R. Maranganti* and **P. Sharma**, "Length Scales at Which Classical Elasticity Breaks Down for Various Materials", *Physical Review Letters*, **98**, 195504-1– 195504-4, 2007
43. X.Zhang*, **P.Sharma** and H.T.Johnson, "Quantum Confinement Induced Strain in Quantum Dots", *Physical Review B*, **75**, 155319-1– 155319-8, 2007
44. N.D. Sharma*, R. Maranganti* and **P. Sharma**, "On the Possibility of Piezoelectric Nanocomposites without using Piezoelectric Materials", *Journal of the Mechanics and Physics of Solids*, **55**, 2328–2350, 2007
45. R. Maranganti* and **P. Sharma**, "A Novel Atomistic Approach to Determine Strain Gradient Elasticity Constants: Tabulation and Comparison for Various Metals,

Semiconductors, Silica, Polymers and the (Ir) relevance for Nanotechnologies", *Journal of the Mechanics and Physics of Solids*, Vol. 55, issue 9, p. 1823-1852, 2007

46. S. Hu**, G. Nathan**, F. Hussain, D.J. Kouri, **P. Sharma**, and G.H. Gunaratne, "On Stability of Self-Assembled Nanoscale Patterns", *Journal of the Mechanics and Physics of Solids*, **55**, 1357– 1384, 2007
47. **(Invited Review Article)** R.Maranganti*, **P.Sharma**, and L.Wheeler, "Quantum Notion of Stress"*, Journal of Aerospace Engineering,* **20**, 22– 37, 2007
48. **P. Sharma**, and L.T. Wheeler, "Size-dependent Elastic State of Ellipsoidal Nano-inclusions Incorporating Surface/Interface Tension", *Journal of Applied Mechanics*,74, 447– 454, 2007
49. X. Peng**, S. Ganti, **P. Sharma**, A. Alizadeh, S. Nayak, S. Kumar, "Strain Engineered Photoluminescence of Silicon Nanoclusters", *Physical Review B* **74**,035339-1– 035339-5, 2006
50. R. Maranganti*, N.D. Sharma* and **P. Sharma**, "Electromechanical Coupling in Non-piezoelectric Materials due to Nonlocal Size Effects at the Nanoscale: Fundamental Solutions (Green's Functions) and Embedded Inclusions", *Physical Review B* **74**,014110-1– 014110-14, 2006
51. X. Zhang*, J.Kun**, **P. Sharma** and B. Yakobson, "An Atomistic and Non-classical Continuum Field Theoretic Perspective of Elastic Interactions between Defects (Force Dipoles) of Various Symmetries and Application to Graphene", *Journal of the Mechanics and Physics of Solids*, **54**, 2304-2329, 2006
52. **P. Sharma** and X. Zhang*, "Gauge Field Theoretic Solution of a Uniformly Moving Screw Dislocation and Admissibility of Supersonic Speeds", *Physics Letters* A 349, 170–176, 2006
53. X. Zhang* and **P. Sharma**, "On the Scaling of Strain in Arbitrary Shaped, Anisotropic Embedded Quantum Dots due to (Nonlocal) Dispersive Effects ", *Physical Review B*, **72**, 195345, 2005
54. X. Peng**, S. Ganti, **P.Sharma**, A. Alizadeh, S. Nayak, S. Kumar, "Novel Scaling Laws for Band Gaps of Quantum Dots", *Journal of Computational and Theoretical Nanotechnology, **2**, 3,* 2005
55. A. Mathur**, **P. Sharma**, R. Cammarata, "Negative Surface Energy: A Cautionary Note", *Nature Materials*, **4**, 186, 2005
56. Z. Li**, P. Dharap**, **P. Sharma**, S. Nagarajaiah and B. Yakobson, "A Physically Inspired Continuum Field Interpretation of (Stone-Wales) Defect Formation in Single Walled Carbon Nanotubes", *Journal of Applied Physics*,**97**,074303, 2005
57. F. Shahedipour-Sandvik, J. Grandusky, A. Alizadeh, C. Keimel, S. P. Ganti, S. T. Taylor, S. F. LeBoeuf and **P. Sharma**, "Strain Dependent Facet Stabilization in Selective-area Heteroepitaxial Growth of GaN Nanostructures", *Applied Physics Letters*, **87**, 233108, 2005
58. X. Zhang* and **P. Sharma**, "Inclusions and Inhomogeneities in Second Gradient Elasticity with Couple Stresses and Related Problems", *International Journal of Solids and Structures*,**42**,3833, 2005
59. **P. Sharma**, and S. Ganti, "Gauge-field-theory Solution of the Elastic State of a Screw Dislocation in a Dispersive (non-local) Crystalline Solid ",*Proceedings of the Royal Society*, **461**, 1081, 2005
60. **P. Sharma**, A. Dasgupta, and G.Cuddalorepatta**, "The Connection Between Microstructural Damage Modeling and Continuum Damage Modeling for Eutectic Sn-Pb Solder Alloys", accepted, *International Journal of Damage Mechanics,* 14, 343-363, 2005

61. A. Alizadeh, **P. Sharma**, S. Ganti, S. LeBoeuf, L. Tsakalakos, "Templated Wide Bandgap Nanostructures", *Journal of Applied Physics*, **95,** No. 12, 8199, 2004
62. **P. Sharma**, S. Ganti, H. Ardebili, A. Alizadeh, "Scaling of Thermal Stresses in Passivated Nano-interconnects", *Journal of Applied Physics*, **95**, No. 5, p 2763, 2004
63. **P. Sharma** and S. Ganti, "Size-dependent Eshelby's Tensor for Embedded Nano-inclusions Incorporating Surface/Interface Energies", *Journal of Applied Mechanics*, Vol 71, 663, 2004
64. **P. Sharma**, "Inclusions and Defects in Chiral Solids", *International Journal of Solids and Structures*, **41**,6317, 2004
65. **P. Sharma**, S. Ganti and N. Bhate, "The Effect of Surfaces on the Size-Dependent Elastic State of (Nano) Inhomogeneities", *Applied Physics Letters*, **82**, No 4, 2003
66. **P. Sharma**, and S. Ganti, "On the Grain-size Dependent Elastic Modulus of Nanocrystalline Materials with and without Grain Boundary Sliding", *Journal of Materials Research*, 1823-1826, 18, No.8, 2003
67. **P. Sharma**, and S. Ganti, "The Size-dependent Elastic State of Inclusions in Non-local Elastic Solids", *Philosophical Magazine Letters,* Vol. 83, No. 12, 745, 2003
68. **P. Sharma**, and R. Sharma, "On the Eshelby's Inclusion Problem for Ellipsoids with Non-Uniform Dilatational Gaussian and Exponential Eigenstrains", *Journal of Applied Mechanics*, 70, No 3, 418-425, 2003
69. **P. Sharma**, A. Dasgupta, S. Ganti and J. Loman, "Prediction of Rate-Independent Constitutive Behavior of Pb-Free Solders Based on First Principles", *IEEE Transactions on Components and Packaging*, **26**,659, 2003
70. **P. Sharma**, and A. Dasgupta, "Scale-Dependent Average Elastic Fields of Spherical and Cylindrical Inhomogeneities in Micropolar Medium and Overall Properties", *Physical Review* B **66**, 2241XX, 2002
71. **P. Sharma**, and S. Ganti, "Interfacial Elasticity Corrections to the Elastic State of Quantum Dots*", Physica Status Solidi* (b) **234**, No.3, R10–R12, 2002
72. **P. Sharma**, H. Ardebili and J. Loman, "A Note on the Thermal Stresses in Passivated Metal Interconnects", *Applied Physics Letters*, Vol. 79, No. 11, p 1706, 2001

SELECTED GRANTS

(1) NSF grant on nanocapacitors for energy storage, 2010-2013, **$ 280, 000, PI: Sharma**, 33 %
(2) NSF GK12-Program, 2009-2014, **$ 3 million, PI: Sharma**, 20 %
(3) AFOSR Program on high temperature materials, 2009-2014, $ 1.6 million, Sharma's share (**$400, 000**), PI is Ken White
(4) NSF International Materials Institute, 2009-2014, **$ 2.3 million,** Sharma's share ($ 17 %). PI is Dimitris Lagoudas in Texas A&M University.
(5) NSF grant on "giant" piezoelectricity, 2008-2012, **$ 390, 000**, **PI: Sharma**, 50 %
(6) NSF NIRT, 2007-2012, **$ 1.20 million**, **PI: Sharma**, 25 %
(7) Aerospace Workforce Innovation Network (AWIN), Texas Workforce Commission, 2007-2009, 2 years, **$ 248, 944**, **PI: Karolos Grigoriadis**, 16 %
(8) NSF, **$3,067** , "US-Tunisia Planning Visit: Research Collaboration between University of Houston and Ecole Polytechnique de Tunisie", **PI: Sharma**, 100 %
(9) ONR Young Investigator Award, 2005-2008, 3 yrs, **$ 262, 471**, **PI: Sharma,** 100 %
(10) Texas Advanced Research Program (2006-2008), 2 yrs, **$ 100, 000**, **PI: Sharma**, 50 %

ACADEMIC AND COMMUNITY SERIVCES:

- Reviewer for: Physical Review Letters, Physical Review B, Physical Review E, Journal of the Mechanics and Physics of Solids, Applied Physics Letters, Philosophical Magazine, Proceedings of the Royal Society, Journal of Physics: Mathematical, Journal of Physics: Condensed Matter, Journal of Materials Research, Journal of Applied Mechanics, International Journal of Solids and Structures, Surface Science, Journal of Mechanics of Materials and Structure, Mathematics and Mechanics of Solids, Journal of Elasticity, Physica Status Solidi
- Organizer of various sessions and symposiums in ASME annual conference 2003-Present.
- (Past) Associate editor of Journal of Computational and Theoretical Nanoscience
- Associate editor of Journal of Applied Mechanics
- Associate editor of Journal of the Mechanics and Physics of Solids
- iMechanica Journal Club Founding and Chief Editor

PARTICIPATION in GROUP TEACHING ACTIVITY

- Principal Investigator for the NSF GK12 grant---Co-manage, with other colleagues, the GK12 group teaching project.
- Offer, annually, short course on nanotechnology for high school teachers and GK12 fellows.
- Year around activity: Mentor the 6-9 GK12 PhD fellows.