Name: **G.V.Shivashankar (**http://mbi.nus.edu.sg/g-v-shivashankar/)

Positions held:

- FIRC Institute of Molecular Oncology (IFOM), Milan, Italy & National University of Singapore (NUS), Chair Professor (Since 2014)
- Principal Investigator (Since 2010) & Deputy Director (11-19), Mechanobiology Institute, National University of Singapore
- Head (Since 2014), IFOM-NUS, Joint Research Laboratory
- Associate Professor (10-), Department of Biological Sciences, NUS
- Associate Professor (07-09), National Center for Biological Sciences (NCBS) Tata Institute of Fundamental Research (TIFR), India
- Assistant Professor (00-06; Tenured 2004), NCBS-TIFR, India

Qualification:

- B.Sc. (Physics) Bangalore University, INDIA – 1988
- MS (Engineering) Rutgers University, USA – 1994
- Ph.D. (Biology) The Rockefeller University, USA –1999 (with Prof.Albert Libchaber)

Fellowships:

- Research Fellow (1990-91), Jawaharlal Nehru Center for Advanced Scientific Research, Bangalore, INDIA
- Graduate Research Fellowship/Internship (1992-94), Rutgers University & Nippon Electric Company (NEC) Research Institute, Princeton, USA
- Doctoral Fellowship, (1995-99), The Rockefeller University, New York, USA
- Post-doctoral Fellowship, (1999-00) NEC Research Institute, USA

Professional Affiliation:

- Visiting Scientist (2000 – 2008), Raman Research Institute, Bangalore, INDIA
- Member (2002-2007), Program Management Board, National Nanotechnology Initiative, Department of Science and Technology, INDIA

Membership and services:

- Member, Biophysical Society, USA
- Reviewer for major international grants and Journals
- NUS Leadership Program (Summer-2013)

Awards/Distinctions:

- BM Birla Science Prize, India, 2006
- Swarnajayanthi Fellowship, India 2007
- Elected Fellow of Indian Academy of Sciences, 2010
- IFOM-NUS Chair Professor, 2014
- Elected to EMBO membership in 2019

Publications (in reverse chronological order as of August-2019):

101. Fibroblast rejuvenation by mechanical reprogramming and redifferentiation. Roy B, Luezhen W & Shivashankar GV. 2019, (under review)

100. Heterogeneity in cell geometric states modulates the selective activation of fibroblasts in engineered 3D tumor microenvironments. Venkatachalapathy S, Jokhun DS & Shivashankar GV. 2019, (under review)

99. Predicting cell lineages by generative modeling and optimal transport Karren W, Karthik D, Venkatachalapathy S, Shivashankar GV & Uhler C. 2019, (under review)

98. Nuclear morphometrics and chromatin condensation patterns as disease biomarkers using a mobile microscope. Karthik D, Cresenti M, Jokhun DS & Shivashankar GV. PloS one, 14(7), e0218757.

97. Regulation of nuclear architecture, mechanics and nucleo-cytoplasmic shuttling of epigenetic factors by cell geometric constraints. Farid A, Jokhun DS, Shivashankar GV & Shenoy V. *Proceedings of the National Academy of Sciences – PNAS*, 2019, 02035.

96. Mechanical regulation of genome architecture and cell-fate decisions. Shivashankar GV. *Current Opinion in Cell Biology*, 2019, *56*, 115-121.

95. Actin dynamics couples extracellular signals to the mobility and molecular stability of telomeres, Jokun DS, Yuqing S & Shivashankar GV. *Biophysical Journal,* 2018 Oct 2;115(7):1166-1179.

94. Compressive force induces reversible chromatin condensation and cell-geometry dependent transcriptional response, Karthik D, Venkatachalapathy S, Farid A, Jokhun DS, Shenoy V & Shivashankar GV. *Molecular Biology of the Cell,* 2018 Sep 26;E18040256.

93. Localized mechanical stimulation of single cells with engineered spatio temporal profile Monticelli M, Jokhun DS, Petti D, Shivashankar GV & Bertacco R. *Lab On a Chip*, (2018-in press)

92. Laterally confined growth of cells induces nuclear reprogramming in the absence of exogenous biochemical factors, Roy B, Venkatachalapathy S, Ratna P, Wang Y, Jokhun DS, Nagarajan M, Shivashankar GV. *Proceedings of the National Academy of Sciences – PNAS* 2018 May 22;115(21):E4741-E4750.

91. Nuclear mechanopathology & cancer diagnostics, Caroline Uhler and G.V.Shivashankar, *Trends in Cancer*, 2018 Apr;4(4):320-331.

90. Mechanical Strain Alters Cellular and Nuclear Dynamics at Early Stages of Oligodendrocyte Differentiation, Makhija E, Jagielska A, Zhu L, Bost AC, Ong W, Chew SY, Shivashankar GV, Van Vliet KJ. *Front Cell Neurosci.* 2018 Mar 6;12:59.

89. Maximal Fluctuations of Confined Actomyosin Gels: Dynamics of the Cell Nucleus. Rupprecht JF, Singh Vishen A, Shivashankar GV, Rao M, Prost J. *Phys Rev Lett.* 2018 Mar 2;120(9):098001.

88. TGFβ Promotes Genomic Instability after Loss of RUNX3. Krishnan V, Chong YL, Tan TZ, Kulkarni M, Bin Rahmat MB, Tay LS, Sankar H, Jokhun DS, Ganesan A, Chuang LSH, Voon DC, Shivashankar GV, Thiery JP, Ito Y. *Cancer Res.* 2018 Jan 1;78(1):88-102.

87. Regulation of genome organization and gene expression by nuclear mechanotransduction, Caroline Uhler & G.V.Shivashankar, *Nature Reviews Molecular Cell Biology*, 2017 Dec;18(12):717-727

86. Machine learning for nuclear mechano-morphometric biomarkers in cancer diagnosis, Adityanarayanan Radhakrishnan, Karthik Damodharan, Ali C.Soylemezoglu, Caroline Uhler & G.V.Shivashankar, *Scientific Reports* 2017 Dec 20;7(1):17946

85. Network analysis identifies chromosome intermingling regions as regulatory hotspots for transcription, Anestsiya Belyaeva, Saradha V.Pathy, G.V.Shivashankar & Caroline Uhler, *Proceedings of the National Academy of Sciences – PNAS* 2017 Dec 26;114(52):13714-13719

84. DNA damage causes rapid accumulation of phosphoinositides for ATR signaling, Wang YH, Hariharan A, Bastianello G, Toyama Y, Shivashankar GV, Foiani M, Sheetz MP. *Nature Commun.* 2017 Dec 14;8(1):2118.

83. RNA:RNA interactions control the DNA damage response at individual genomic sites Flavia Michelini, Sethuramasundaram Pitchiaya, Valerio Vitelli, Sheetal Sharma, Ubaldo Gioia, Fabio Pessina, Matteo Cabrini, Yejun Wang, Ilaria Capozzo, Fabio Iannelli, Valentina Matti, Sofia Francia, G.V. Shivashankar, Nils G. Walter and Fabrizio d'Adda di Fagagna *Nature Cell Biology* (2017) Dec;19(12):1400-1411.

82. Chromosome intermingling as mechanical hotspots for genome regulation, Caroline Uhler & G.V.Shivashankar, *Trends in Cell Biology* (invited review 2017: S0962-8924 (17) 30104-6

81. Cell geometry orients and repositions chromosomes to regulate genomic programs, Yejun Wang, Mallika Nagarajan, Caroline Uhler and G.V.Shivashankar *Molecular Biology of the Cell*, (2017) 28(14):1997-2009

80. Cell-geometric-constraints differentially regulate TNFα-mediated gene expression programs, Aninda Mitra, Saradha.V. Pathy, Prasuna Rao, Yejun Wang, Jokhun Kamal and G.V.Shivashankar *Proceedings of the National Academy of Sciences-USA* – (2017) May 1. pii: 201618007.

79. Coupling between chromosome intermingling and gene regulation during cellular differentiation. Wang Y, Jain N, Nagarajan M, Maharana S, Iyer KV, Talwar S, Shivashankar GV. *Methods.* 2017 Jul 1;123:66-75.

78. Nuclear positioning and its translation dynamics is regulated by cell geometry, K. Radhakrishna, Jokhun Kamal, Saradha V. Pathy and G.V.Shivashankar *Biophysical Journal* (2017) 112(9):1920-1928

77. Mechanical Strain Promotes Oligodendrocyte Differentiation by Global Changes of Gene Expression. Jagielska A, Lowe AL, Makhija E, Wroblewska L, Guck J, Franklin RJM, Shivashankar GV, Van Vliet KJ. *Front Cell Neurosci*. 2017 Apr 20;11:93.

76. Superresolution imaging of nanoscale chromosome contacts, Yejun Wang, Prasuna Ratna and G.V. Shivashankar *Scientific Reports* (2017) Feb 10;7:42422.

75. How cells respond to environmental cues - insights from bio-functionalized substrates. Ruprecht V, Monzo P, Ravasio A, Yue Z, Makhija E, Strale PO, Gauthier N, Shivashankar GV, Studer V, Albiges-Rizo C, Viasnoff V. *J Cell Sci.* 2017 Jan 1;130(1):51-61.

74. Geometric control and modeling of genome reprogramming, Caroline Uhler and G.V. Shivashankar. *BioArchitecture.* (2016) Jul 19:1-9.

73. Dynamic interaction between actin and nesprin2 maintain the cell nucleus in a prestressed state. Kumar A, Shivashankar GV. *Methods Appl Fluoresc.* 2016 Nov11;4(4):044008.

72. Nuclear plasticity and telomere dynamics is modulated by extra-cellular matrix constraints, Ekta Makhija, Jokhun Kamal and G.V.Shivashankar, *Proceedings of the National Academy of Sciences-USA* (2016) 113(1):E32-40.

71. Matrix Mechanics Controls FHL2 Movement to the Nucleus to Activate p21/CDKN1A Expression, Naotaka Nakazawa, Aneesh R. Sathe, G. V. Shivashankar and Mike Sheetz *Proceedings of the National Academy of Sciences-USA* (2016) Nov 1;113(44):E6813-E6822.

70. Nuclear transport of paxillin depends on focal adhesion dynamics and FAT Domains, Aneesh Sathe, G.V.Shivashankar and Mike Sheetz, *Journal of Cell Science* (2016) 129(10):1981-8.

69. Chromosome intermingling - the physical basis of chromosome organization in differentiated cells, Shovamayee Maharana, K.Venkatesan Iyer, Nikhil Jain, Mallika Nagarajan, Yejun Wang and G.V.Shivashankar *Nucleic Acids Research*, (2016) doi: 10.1093/nar/gkw131

68. Role of Cell Geometry on Nuclear Mechanics, Chromosome Reorganization, and Gene Expression, Yejun Wang, Ekta Makhija, Karthik Damodharan and G.V.Shivashankar *Molecular and Cellular Mechanobiology* (2016, Edited by Chien, Engler and Wang), Springer Press.

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63. Micropillar displacements by cell traction forces are mechanically correlated with nuclear dynamics, Li Qingsen, Ekta Makhija, F.M. Hameed and G.V.Shivashankar, *Biochemical and Biophysical Research Communications,* (2015) 461(2):372-7

62. Cytoskeletal control of nuclear morphology and chromatin organization, Nisha M Ramdas and G.V.Shivashankar, *Journal of Molecular Biology* (2015) 427(3):695-706

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59. Super-resolution microscopy reveals decondensed chromatin structure at transcription sites, Yejun Wang, Shovamayee Maharana, Michelle Wang & G.V.Shivashankar *Scientific Reports* (2014) Mar 26;4:4477

58. Acto-myosin contractility rotates the cell nucleus Abhishek Kumar, Ananyo Maitra, Madhuresh Sumit, Sriram Ramaswamy & G.V. Shivashankar *Scientific Reports* 2014 Jan 21;4:3781

57. ATR mediates a mechanical checkpoint at the nuclear envelope in response to membrane stress. Amit Kumar, Michele Mazzanti, Martin Mistrik, Galina Beznusenko, Alexandre Mironov, Massimiliano Garre, Dario Parazzoli, G.V. Shivashankar, Giorgio Scita, Jiri Bartek and Marco Fioni (2014) *Cell*, 158, 633-646

56. Yap-Taz as mechanosensors and mechanotransducers in regulating organ size and tumor growth Low BC, Pan CQ, G.V.Shivashankar, Bershadsky A, Sudol M, Sheetz M. (2014) *FEBS Lett.* 19;588(16):2663-2670

55. Multivariate biophysical markers predictive of mesenchymal stromal cell multipotency, Wong Cheng Lee, Hui Shi, Zhiyong Poon, Lin Myint Nyan, Tanwi Kaushik, G V. Shivashankar, Jerry K Y Chan, Chwee Teck Lim, Jongyoon Han & Krystyn J. Van Vliet, *Proceedings of the National Academy of Sciences-USA* (2014) Oct 21;111(42):E4409-18

54. Probing Chromatin Structure and Dynamics Using Fluorescence Anisotropy Imaging, Ekta Makhija, K. Venkatesan Iyer, Shefali Talwar & G.V.Shivashankar *CRC Handbook, Imaging Biological Mechanics* (2014)

53. The C-terminal domain (CTD) in linker histones antagonizes anti-apoptotic proteins to modulate apoptotic outcomes at the mitochondrion. M.Garg, N.Ramdas, M.Vijayalakshmi, G.V.Shivashankar, A.Sarin *Cell Death & Disease* (2014) 5:e1058.

52. The linker histone H1.2 is an intermediate in the apoptotic response to cytokine deprivation to T-cell effectors Garg M, Perumalsamy LR, G.V.Shivashankar, Sarin A. *Int J Cell Biol.* (2014): 674753

51. Model for deformation of cell nucleus by cortical actin layer Gur Fabrikanth, Soumya Gupta, G.V.Shivashankar & Misha Kozlov *Biophysical Journal* (2013) 105:1316-23.

50. Cell geometric constraints induce modular gene-expression patterns via redistribution of HDAC3 regulated by actomyosin contractility Nikhil Jain, K.Venkatesan Iyer, Abhishek Kumar & G.V.Shivashankar *Proceedings of the National Academy of Sciences* (2013) 110: 11349-54

49. Correlated spatio-temporal fluctuations in chromatin compaction states characterize stem cells, Shefali Talwar, Abhishek Kumar, Madan Rao, Gautam Menon & G.V.Shivashankar *Biophysical Journal* (2013) 104:553-64

48. Dynamic organization of transcription factories is dependent on functional nuclear architecture Shovamayee Maharana, Divya Sharma, Shi Xianke & G.V. Shivashankar *Biophysical Journal* (2012) 103:851-859

47. Mechanical activation of cells reveals distinct timescales in chromatin remodeling and MKL nuclear transport Venkatesan Iyer, Stephanie Pulford, Alex Mogilner & G.V.Shivashankar *Biophysical Journal* (2012) 103:1416-1428

46. Mechanical force alters morphogenetic movements and segmental gene expression patterns during Drosophila embryogenesis Abhishek Kumar & G.V. Shivashankar *PLoS One.* 2012;7(3):e33089

45. Developmental heterogeneity in DNA packaging patterns influences T-cell activation and transmigration Soumya Gupta, Shefali Talwar, R.Indulaxmi, Lakshmi R. Perumalsamy, Apurva Sarin & G.V.Shivashankar *PLoS One.* 2012;7(9):e43718

44. Modeling and experimental methods to probe the link between global transcription and spatial organization of chromosomes K.Venkatesan Iyer, Shovamayee Maharana, Soumya Gupta, Albert Libchaber, Tsvi Tlusty & G.V. Shivashankar *PLoS One.* 2012;7(10):e46628. *(Faculty of 1000 publication)*

43. Dynamics of passive and active particles in the cell nucleus Feroz Meeran, Madan Rao & G.V.Shivashankar *PLoS One.* 2012;7(10):e45843.

42. Role of actin dependent nuclear deformation in regulating early gene expression, Soumya Gupta, Nimi Marcel, Apurva Sarin & G.V.Shivashankar *PLoS-One.* 2012;7(12):e53031

41. Mechanosignaling to cell nucleus and genome regulation G.V.Shivashankar, *Annual Reviews of Biophysics,* (2011), Vol.40, 361-378

40. Integrin adhesion drives the emergent polarisation of active cytoskeletal stresses to pattern cell delamination C Meghana, Nisha Ramdas, Feroz Hameed, Madan Rao, G.V. Shivashankar & Maithreyi Narasimha, *Proceedings of the National Academy of Sciences-USA* (2011), 108, 9107-9112

39. Dynamic organization of chromatin assembly & transcription factories in living cells Bidisha Sinha, Dipanjan Bhattacharya, Deepak Kumar Sinha, Shefali Talwar, Shovamayee Maharana, Soumya Gupta & G. V.Shivashankar, *Methods Cell Biol.* (2010) 98, 57-78

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37. Emergence of prestressed eukaryotic nucleus during cellular differentiation and development Mazumder A, Shivashankar GV.*J R Soc Interface.* (2010) Suppl 3:S321-30.

36. Spatio-temporal plasticity in chromatin organization in mouse cell differentiation & during Drosophila embryogenesis Dipanjan Bhattacharya, Shefali Talwar, Aprotim Mazumder & G.V.Shivashankar, *Biophysical Journal* (2009) 96, 3832-3839

35. Probing structural stability of chromatin assembly sorted from living cells, FM Hameed, G.V.Soni, H.Krishnamurthy & G.V.Shivashankar, *Biochem Biophys Res Commun.* (2009) 385, 518-522

34. Probing the dynamic organization of transcription compartments and gene loci within the nucleus of living cells Deepak Kumar Sinha, Bidisha Banerjee, Shovamayee Maharana, & G.V.Shivashankar *Biophysical Journal* (2008) 95, 5432-5438

33. Dynamics of chromatin decondensation reveals the structural integrity of a mechanically prestressed cell nucleus T.Roopa, Aakash Basu, Aprotim Mazumder, L.Mahadevan & G.V.Shivashankar *Biophysical Journal* (2008) 95, 3028-3035

32. Gold-nanoparticle-assisted laser ablation of chromatin assembly reveals unusual aspects of nuclear architecture within living cells Aprotim Mazumder & G.V.Shivashankar *Biophysical Journal* (2007) 93, 2209-2216

31. Thermal fluctuations in histone during denaturation K.S.Nagapriya, A.K.Raychaudhuri & G.V.Shivashankar *J Nanosci Nanotechnol* (2007) 7, 2125-2128

30. Simulations of SIN Mutations and Histone Variants in Human Nucleosomes Reveal Altered Protein-DNA and Core Histone Interactions M.Vijayalaxmi, G.V.Shivashankar & R.Sowdhamini *J Biomol Struct Dyn* (2007) 25, 207-218

29. Trichostatin-A induces differential changes in histone protein dynamics and expression in HeLa cells Jyothsna Rao, Dipanjan Bhattacharya, Bidisha Banerjee, Apurva Sarin & G.V.Shivashankar *Biochem Biophys Res Commun* (2007) 363, 263-268

28. Mechanical unfolding of DNA-histone complex reveals distinct levels in its nanoscale organization. G.V.Soni, Feroz Meeran & G.V.Shivashankar
Applied Physics Letters – (2007), 90, 163904

27. Direct measurement of chromatin fluidity using optical trap modulation force spectroscopy, T.Roopa & G.V.Shivashankar *Biophysical Journal* – (2006) 91, 4632-4637

26. Core and linker histones diffuse via distinct mechanisms within living cells Dipanjan Bhattacharya, Aprotim Mazumder, M.Anne & G.V.Shivashankar
Biophysical Journal (2006), 91, 2326-2336

25. Chromatin assembly exhibits spatio-temporal heterogeneity within the cell nucleus Bidisha Banerjee, Dipanjan Bhattacharya & G.V.Shivashankar
Biophysical Journal (2006), 91, 2297-2303 (Cover page)

24. Probing mRNA conformational heterogeneity using single-molecule fluorescence anisotropy Deepak Sinha, S.Sastry & G.V.Shivashankar
Applied Physics Letters (2006) 88, 3901-3903

23. Origins & implications of long-tailed distributions in gene expression, Sandeep Krishna, Bidisha Banerjee, T.V.Ramakrishnan & G.V.Shivashankar *Proceedings of the National Academy of Sciences-USA* (2005), 102, 4771-4776

22. Kinetic measurement of ribosome motor stalling force Deepak Sinha, U.S.Bhalla & G.V.Shivashankar, *Applied Physics Letters* (2004), 85, 4789-4791

21. Probing collective dynamics of active particles using modulation force spectroscopy, G.V.Soni, G.Ananthakrishna & G.V.Shivashankar,
Applied Physics Letters (2004), 85, 2414-2416

20. Dynamics of Membrane Nanotubulation and DNA Self-Assembly,
T.Roopa, N.Kumar, S.Bhattacharya & G.V.Shivashankar,
Biophysical Journal (2004), 87, 974-979

19. Development of single molecule tracking fluorescence microscope combined with force spectroscopy for gene expression analysis. Deepak Sinha, Dipanjan Bhattacharya, Bidisha Banerjee, Feroz Meeran & G.V.Shivashankar, *Current Science,* 2004, 87:239-244.

18. Tracking operator state fluctuations in gene expression in single cells. Bidisha Banerjee, S.Balasubramanian, G.Ananthakrishna, T.V.Ramakrishnan & G.V.Shivashankar *Biophysical Journal* (2004), 86, 3052-3059

17. Nanomechanics of membrane tubulation and DNA assembly
T.Roopa & G.V.Shivashankar *Applied Physics Letters* (2003), 82, 1631-1633

16. Single particle tracking of correlated bacterial dynamics, G.V.Soni, B.M.Jaffar Ali, Y.Hatwalne & G.V.Shivashankar *Biophysical Journal* (2003), 84, 2634-2637

15. Development of an optical tweezer combined with micromanipulation for DNA & Protein nanobioscience, G.V.Soni, Feroz Meeran, T.Roopa & G.V.Shivashankar, *Current Science* (2002), 83, 1464-1470

14. Mesoscopic Biology G.V.Shivashankar, *Pramana-Indian Journal of Physics*, (2002) 58: 439-442

Undergraduate, PhD & Postdoctoral research (1988-2000):

13. Control of the expression of anchored genes using micron scale heaters G.V.Shivashankar, S.Liu, A.Libchaber *Applied Physics Letters* (2000) 76:3638-3640

12. Method for linking a synthesized protein to its mRNA-DNA complex. S.Liu, G.V.Shivashankar, Sano T, A.Libchaber, *Biotechniques* (2000) 29:792-798

11. Aspects of DNA assembly: extension, lithography and recognition. G.V.Shivashankar and A.Libchaber *Current Science-Indian Academy of Sciences* (1999) 76:813-818

10. RecA polymerization on double-stranded DNA by using single- molecule manipulation: The role of ATP hydrolysis. G.V.Shivashankar, M.Feingold, O.Krichevsky and A.Libchaber *Proceedings of the National Academy of Sciences-USA* (1999) 96:7916-7921

9. Biomolecular recognition using submicron laser lithography G.V.Shivashankar and A.Libchaber *Applied Physics Letters* (1998) 73:417-419

8. Backscattering from a tethered bead as a probe of DNA flexibility G.V. Shivashankar, G.Stolovitzky and A.Libchaber *Applied Physics Letters* (1998) 73:291-293

7. Single DNA molecule grafting and manipulation using a combined atomic force microscope and optical tweezers G.V.Shivashankar and A.Libchaber, *Applied Physics Letters* (1997) 71:3727-3729

6. Low temperature Scanning Tunneling Microscope in a high magnetic field G.V.Shivashankar, Mark Higgins, Kenn Fasenella and S.Bhattacharya *NEC Technical Report* (1994) TR# 94-028-2-0036

5. Normal state tunneling conductance of perovskite oxides: Implications to high Tc superconductors H.Srikanth, K.P.Rajeev, G.V.Shivashankar and A.K.Raychaudhuri *Physica* C (1992) 195:87-90

4. Behaviour of power MOSFET's at T=4.2 to 300 K R.Karunanidi, A.K.Raychaudhuri, F.Zhucs and G.V.Shivashankar *Cryogenics* (1991) 31:1065-1070

3. Low temperature electronic properties of a normal conducting perovskite oxide - $LiNiO_3$ K.P.Rajeev, G.V.Shivashankar and A.K.Raychaudhuri *Solid state communications* (1991) 79:591-595

2. A cryostat for point contact and tunneling measurements in a magnetic field G.V.Shivashankar and K.P.Rajeev *Measurement Science and Technology* (1991) 2:1031-1035

1. Observation of coulomb blockade at T=300K G.V.Shivashankar and A.K.Raychaudhuri *Pramana: Indian Journal of Physics* (1990) 35:183-186

US Patents:

- A method for immobilizing and patterning biomolecules on a substrate using localized laser absorption and sub-micron lithography
  G.V.Shivashankar and A.Libchaber (2000) US pat.# 6139831

- Gene expression control using micron scale microarray heaters
  G.V.Shivashankar, S.Liu and A.Libchaber (2002) US pat.# 6489106

Book/Special Issue:

- Nuclear Mechanics & Genome Regulation (2010)
  G.V.Shivashankar, Editor, Methods in Cell Biology series, Elsevier Press

- Integrative Biology Journal, Special Issue on Mechanobiology (2015)
  Guest Editors, G.V.Shivashankar, Michael Sheetz & Paul Matsudaira

- Textbook: "Introduction to Nuclear Mechanics & Genome Regulation"
  G.V.Shivashankar, Academic Press (tentative publication year 2020)

Conference organization and invited lectures:

Over the last few years, Shivashankar has been part of organizing (more than twenty-five) and presenting at a number of major international meetings and universities (more than hundred) related to Mechanobiology, Genomics and Bioengineering.

Invited Minisymposium Co-chair: American Society for Cell Biology, San Diego, Dec-15
Chair: Mechanobiology subgroup meeting, Biophysical Society, Los Angeles Jan-16
Organizer: EMBO workshop on Nuclear Mechano-Genomics, Singapore, April-18

Selected invited lectures (2012-2019):

- International Conference on Stem Cells and Regenerative Medicine (UK), 2012
- Conference on deGennesDays|PhysCell2012 (France), 2012
- Joint Weizmann-Singapore Conference on Symmetry Breaking and Pattern Formation (Israel), 2012
- Asian Forum of the Chromosome and Chromatin Biology (Hyderabad, India), 2012
- UK-India Conference on "Human Pluripotent Stem Cells: Progress to Therapy. Contributions from Developmental Biology" (Sheffield, UK), 2013
- International workshop and conference on 'Mechanical manipulation and responses at the cell of scale and beyond': Co-organizer (Bangalore, India), 2013
- Biophysical Society Meeting, (USA), 2013
- The 4D Nucleome Workshop: Functional Nuclear Organisation in Space and Time (Mainz, Germany), 2013
- 1st Korea Symposium on Current Trends in Biophysics (South Korea), 2013
- 3rd International Soft Matter Conference at University La Sapienza: Plenary speaker (Rome, Italy), 2013
- Biomedical Engineering Society: Cell and Molecular Bioengineering Conference: Keynote Lecture (CA, USA), 2014

- "EM: Frontiers in Bioimaging" Conference at NCBS: Co-organizer (Bangalore, India), 2014
- American Society for Biochemistry and Molecular Biology (ASBMB) Annual Meeting (CA, USA), 2014
- International Workshop on Multiscale Mechanobiology (IWMM) (Hong Kong), 2014
- Conference on "Experimental approaches in mechanotransduction: from molecules to tissues and pathologies" (France), 2014
- Stem cell mechanics' Symposium at the 7th World Congress of Biomechanics 2014 (Boston, USA), 2014
- EMBO Meeting on "Cellular Plasticity & Nuclear Dynamics" (Singapore), 2014
- International Conference on "Models of Life", (Denmark), 2015
- EMBO Meeting on "Stem-cell Mechanobiology" (Italy), 2015
- EMBO Meeting on "Telomere Dynamics" (Singapore), 2015
- ASCB Annual meeting, San Diego, 2015
- Asian Transcription Meeting, Singapore, 2015
- International workshop on Genome Dynamics, Hongkong, 2016
- International workshop on Quantitative Biology of Signaling, France, 2016
- Physics of Cancer, GRC meeting, USA, 2017
- EMBO Meeting on "Nuclear Mechanogenomics", Singapore, 2018
- Royal Society Meeting on "Physics of Cancer", England, 2018
- EMBO Meeting on "Physics of Cells", England, 2018
- Les Houches "Chromatin Workshop", France, 2019
- Gordon Research Conference, "Genome Architecture in Disease", Hongkong, 2019

PhD thesis supervised from my group (2000-2019):

My laboratory is committed to training the next generation of scholars. A large number of undergraduate, PhD and postdoctoral scientists (more than sixty) have carried out research in our laboratory. Most of them have outstanding fellowships and faculty positions around the world.

- Gautam Soni: Understanding physical interactions leading to structure-function dependence in biological systems (2006). Now faculty at RRI-Bangalore, India.
- T.Roopa: Forcing self-assembled biomolecular structures: a study on membrane nanotubulation and chromatin fibers (2006). Now Senior Researcher in Biotechnology, California.
- Bidisha Banerjee: Study of gene expression noise and chromatin organization in transcription (2007). Now faculty at IISER-Kolkata, India.
- Deepak Sinha: Analysis of kinetic barriers in translation elongation and nuclear body dynamics (2007). Now faculty at IACS-Kolkata, India.
- Dipanjan Bhattacharya: Probing histone dynamics and its functional implications in living cells (2007). Now Senior Scientist at MIT-Singapore Program.
- Aprotim Mazumder: Physical constraints due to cytoplasmic-nuclear elements impose a prestressed state on the eukaryotic cell nucleus (2008). Now faculty at TIFR, India.
- Feroz Meeran: Force induced chromatin remodeling in living cells (2008). Now Senior Scientist at inStem-Bangalore, India.
- Abhishek Kumar: Emergence of nuclear prestress and its homeostatic balance during cellular differentiation and development (2013). Now postdoc at Yale University.

- K.Venkatesan Iyer: Functional integration of mechano-signals to the chromatin organization in living cells (2013). Now postdoc at Max-Planck Dresden.
- Shefali Talwar: Structural plasticity in chromatin organization and its coupling to gene expression during cellular differentiation (2013). Now postdoc at UPenn.
- Soumya Gupta: Transitions in chromatin organization during T-cell differentiation (2013). Now Medical Writer in Australia.
- Shovamayee Maharana: Transcription dependent chromosome organization and nuclear body dynamics (2013). Now postdoc at Max-Planck Dresden.
- Nikhil Jain: Impact of cell geometry on gene expression (2014). Now postdoc at ETH-Zurich.
- Nisha Ramdas: Role of actin & microtubules in regulating nuclear architecture (2015). Now starting an NGO in Bangalore.
- Ekta Makhija: Coupling between acto-myosin contractility and chromatin plasticity (2015). Now postdoc at MIT-Singapore program.
- Yejun Wang: Geometric control of 3D chromosome organization & transcription (2016). Now Research Scientist at a Patent Law Firm, Hongkong.
- Karthik Damodharan: Nuclear mechanical features as biomarkers for diagnostics (2017). Now entrepreneur trainee associate

Ongoing PhD projects:

- Kamal Jokhun: Mechanical regulation of chromatin dynamics and function
- Saradha Pathy: Spatial codes in gene clustering and its co-regulation
- Luezhen Yuan: Role of cellular microenvironment on nuclear reprogramming

Major grants:

Project-1: Probing self-assembled biomolecular systems using force spectroscopy G.V.Shivashankar, Department of Science & Technology, India (2003-2006)

Project-2: Visualizing nanoscale dynamics of chromatin fluidity using fluorescence imaging & spectroscopy, G.V.Shivashankar, Department of Science & Technology, India (2004-2007)

Project-3: Establishing a major Nanobiology and Bioimaging program at the National centre for Biological Sciences, Tata Institute of Fundamental Research, Bangalore, India. G.V.Shivashankar, Satyajit Mayor, Yamuna Krishnan & K.VijayRaghavan Department of Science & Technology, India (2006-2011)

Project-4: Spatio-temporal plasticity in chromatin assembly during cellular differentiation, G.V.Shivashankar, Swarnajayanthi Fellowship (2007-2010), Department of Science & Technology, India

Project-5: Mechanoregulation of nuclear mechanics and gene expression, (2010 - ..) Seed funding (S$300K/year) from Mechanobiology Institute, National University of Singapore, Singapore

Project-6: Nuclear Reprogramming and Cancer (2014-..), Seed funding (S$500K/year) FIRC Institute for Molecular Oncology, IFOM, Milan, Italy

Project-7: Understanding chromatin organization and dynamics at Telomeres (2013-2018). Co-PI on this major program grant (S$25M), Ministry of Education Tier3-grant, Singapore

Project-8: SINGASCOPE: Singapore-wide microscopy network (2018-2023), Co-PI (transferred) on this major infrastructure grant (S$10M), NRF-Singapore

Short biography:

Shivashankar is a principal investigator at the Mechanobiology Institute, National University of Singapore. His laboratory is focused on understanding the role of cell mechanics on nuclear mechanotransduction and genome regulation in living cells using a multi-disciplinary approach. He carried out his PhD research at the Rockefeller University (1994-1999) and Postdoctoral research at NEC Research Institute, Princeton USA (1999-2000). He started his laboratory at the National Center for Biological Sciences, TIFR- Bangalore, India (2000-2009) before relocating to a tenured faculty position at the National University of Singapore in 2009. He was the Deputy Director of the Mechanobiology Institute (2011-2019). More recently he also heads a joint research laboratory with the FIRC Institute of Molecular Oncology (IFOM), Milan, Italy and was appointed as an IFOM-NUS Chair Professor in 2014. His scientific awards include the Birla Science Prize (2006), the Swarnajayanthi Fellowship (2007), and he was elected to the Indian Academy of Sciences (2010) and to the EMBO membership (2019). He will be relocating to a tenured Full Professorship at ETH Zurich jointly with the Paul Scherrer Institute, Switzerland, to start the Laboratory of Mechano-Genomics in January 2020.