

Dr. M. Vijay Kumar
Post-Doctoral Research Fellow and Visiting Scientists
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2019-Till Now

Post-Doctoral Research Fellow, The Hebrew University of Jerusalem, Jerusalem, Israel
Visiting Scientist, Weizmann Institute of Science, Rehovot, Israel.

Project: Fluid dynamics (Particle Image Velocimetry)

2018-2019

Post-Doctoral Research Fellow, Indian Institute of Technology Madras, Chennai-600036, India.

**Project: Microfluidics (Producing drug particles with core-shell morphology for
Pharmaceutical applications)**

2016- 2017

Post-Doctoral Research Fellow, University of Gothenburg, Sweden-41926, Sweden.

Project: Particle Dynamics in Microfluidics.

2015- 2016

Provisional Research Associate, Centre for Nano and Soft Matter Sciences, Bangalore-560013,
India.

Project: Pyroelectricity in Liquid Crystals

Educational Qualification

2009 – 2016

Ph.D in Physics, Centre for Nano and Soft Matter Sciences (Affiliated to Mangalore University),
Bangalore-560013, India.

Thesis: Influence of Confined Geometry on Anisotropic Soft Matter.

2007 – 2009

Masters in Laser and Electro Optical Engineering, Anna University, Chennai-626025, India.

Project: Synthesis and Characterization of ZnO Thin film for electro optical applications.

2005 – 2007

Masters in Physics, The American College, Madurai- 625002, Tamil Nadu, India.

Project¹: Concentration gradient Measurement using Optical Interferometry Techniques

Project²: Setting of Powder Xray Diffracto Meter with automated point detector

2002 – 2005

Bachelors in Physics, VHNSN College, Virudhunagar- 626001, Tamil Nadu, India.

Project: Area Study of Wind Mills

Research and Teaching interests

Microfluidics and Nanofluidics, Particle dynamics in 3D Channels, nano-colloids/nanoparticles, phase transition in soft matter (self-assemblies of liquid crystals molecules, plastic crystals, polymers and gels), X-ray study on soft matter, Rheological study of hydrogel, biological systems, solid/liquid interface, surface treatment, polymer network, Polarizing Optical Microscopy, Image processing, nano-scale confinement study, polarizing optical microscopy, optical Switching, Electro optical study, X-ray, dielectric spectroscopy and calorimetric studies on soft matter.

Scientific Skills

Microfluidics device development and fabrications, soft lithography, etching, PDMS processing, Optical devices, LCD devices, Lasers and optoelectronics, polarizing optical microscopy, Optical manipulations, Xray techniques, Oscillatory rheological techniques, Surface treatment, polymer alignment, ITO electrode pattern formation, surface treatment, nanoparticles composite preparations, image processing, dielectric spectroscopy measurements, x-ray techniques and Electronics and Electrical Circuit Designing and, Instrumentation.

Computer Skills

Language & Software: Matlab, Python and Lab view, C, C++, Visual Basic, Quick Basic,

Operating System: Microsoft Windows, and DOS and Linux.

Professional Research Experience

2017-Till date

Post-Doctoral Research Fellow, Indian Institute of Technology Madras, Chennai-600036, India

2016-2017

Post-Doctoral Research Fellow, University of Gothenburg, Sweden-41926, Sweden.

2015- 2016

Provisional Research Associate, Centre for Nano and Soft Matter Sciences, Bangalore-560013, India

2011 – 2015

Senior Research Fellow, Centre for Nano and Soft Matter Sciences, Bangalore-560013, India.

2009 – 2011

Junior Research Fellow, Centre for Nano and Soft Matter Sciences, Bangalore-560013, India.

Scientific Research Publications (14)

1. **M. Vijay Kumar**, R. Bhargavi, G. G. Nair and S. Krishna Prasad, **Manuscript in preparation, 2019.**
2. J. Fries, **M. Vijay Kumar**, B. Mekonnen Mihiretie, D. Hanstorp, B. Mehlig, Spinning and tumbling of micron-sized triangles in a micro-channel shear flow, *Phys. Fluids*, **2018**, 30, 033304.
3. **M. Vijay Kumar**, S. Krishna Prasad, Y. Marinov, L. Todorova, A.G.Petrov, Flexo-Dielectro-Optical Spectroscopy as a Method of Studying Nanostructured Nematic Liquid Crystals. *Mol. Cryst. Liq. Cryst.*, **2015**, 610, 51–62.
4. Bhavesh K, **M. Vijay Kumar**, C.V. Yelamaggad and S. Krishna Prasad, Enhancement of electrical conductivity of a liquid crystal-gold nanoparticle composite by a gel network of aerosil particles, *Appl. Phys. Lett.* **2015**, 083110-5.
5. **M. Vijay Kumar**, S. Krishna Prasad, D.S. Shankar Rao and P.K. Mukherjee, Competition between anisometric and aliphatic entities: Induction of a new phase in a n-alkane –liquid crystal binary system, *Langmuir*, **2014**, 30, 4465–4473.
6. S. Krishna Prasad, **M. Vijay Kumar**, T. Shilpa and C. V. Yelamaggad Enhancement of electrical conductivity, dielectric anisotropy and director relaxation frequency in composites of gold nanoparticle and a weakly polar nematic liquid crystal, *RSC Adv.*, **2014**, 4, 4453-4462.
7. D.S. Shankar Rao, **M. Vijay Kumar**, S. Krishna Prasad, Uma S. Hiremath, M. Sarvamangala and S. Basavaraja, Novel columnar–calamitic phase sequences in a binary system of bent-core and rod-like mesogens, *J. Mater. Chem. C*, **2013**, 1, 7488–7497.
8. K. S. Krishnamurthy, Pramoda Kumar and **M. Vijay Kumar**, Polarity-sensitive transient patterned state in a twisted nematic liquid crystal driven by very low frequency fields, *Phys.Rev. E.*, **2013**, 87, 022504-11.
9. S. Krishna Prasad, **M. Vijay Kumar**, C.V. Yelamaggad, Dual frequency conductivity switching in a carbon nanotube/liquid crystal composite, *Carbon*, **2013**, 59, 512-517.

10. ***M. Vijay Kumar***, S. Krishna Prasad, Composites of single walled carbon nanotubes and liquid crystals as switchable conductors, *NPCM*, **2013**, 4, 425–429.
11. ***M. Vijay Kumar***, S. Krishna Prasad, D.S. Shankar Rao & E.P. Pozhidaev Confinement driven effects in a room temperature ferroelectric liquid crystal: X-ray, linear and non-linear dielectric investigations, *Phase Transitions*, **2013**, 86, 323–338.
12. M. Sarvamangala, ***M. Vijay Kumar***, S.M. Khened, S.Basavaraja , D.S. Shankar Rao & S. Krishna Prasad, Anomalous dielectric behavior in the nematic and isotropic phases of a strongly polar–weakly polar binary system, *Phase Transitions*, **2013**,86, 454–462.
13. ***M. Vijay Kumar*** and S. Krishna Prasad, influence of quenched disorder created by nanosilica network on phase transitions in tetracosane, *RSC Advances*, **2012**, 2, 8531–8538.
14. ***M. Vijay Kumar***, S. Krishna Prasad, and D. S. Shankar Rao, Confinement-Driven Weakening of the Rotator Phase Transitions in an Alkane through a Possible Tricritical Point, *Langmuir*, **2010**, 26, 18362–18368.

National and International Conference/Seminar attended

1. ***One-day Inter-Collegiate Seminar on “Electronic Communication”*** on 11.2.2003, Department of Physics, V. V. Vanniperumal College for Women, Virudhunagar-626001, Tamilnadu, India.
2. ***11th National Seminar on Crystal Growth (with International Participation)***, during December 7-9, 2006, SSN College of Engineering, SSN Nagar, Kalavakkam - 603110, Chennai, Tamilnadu, India.
3. ***2nd National Symposium on Non-Linear Optical Crystals and Modeling in Crystal Growth*** during March 26-27, 2007. Department of Physics, Anna University, Chennai-600025, Tamilnadu, India.
4. ***17th National Conference on Liquid Crystals*** during 15-17 November, 2010, Department of Chemistry, VeerNarmad South Gujarat University, Surat-395007, Gujarat, India.
5. ***18th National Conference on Liquid Crystals*** during 15-17 November, 2011, Department of Physics, North Eastern Regional Institute of Science & Technology, Itanagarat-791109, Arunachalpradesh, India.
6. ***IUPAC–Sponsored International Symposium on Macro-And Supramolecular Architechures and Materials: Nano System and Applications***, Organized by Centre for Nano Science and Technology K.S. Rangasamy College of Technology, Thrichencode-637 215, Tamilnadu, India.

7. **21th National Conference on Liquid Crystals** during 10-12 November, 2014, Vikramajit Singh Sanatan Dharm (VSSD) College, Chhatrapati Shahu Ji Maharaj University, Kanpur, India.
8. **25th International Liquid Crystal Conference ILCC2014** 29 June -4 July 2014 Conference Centre, Arts Block, Trinity College Dublin, Dublin 2, Ireland.

Scientific Instrument Handled

1. Xray - Diffracto Meter(Enraf nonius-582) with goniometry Setup.
2. Xray - Diffracto Meter(Enraf nonius-582) with 2D Image Plate Setup.
3. PANalyticalXray- Diffractor Meter with high-resolution Detector.
4. XenocsXray Beam Delivery System with Mar345 Image Plate System
5. Dielectric Spectroscopy analyzer (Nova Control)
6. Impedance Analyzer(4194A) and LCR meter (4284a).
7. Advanced Optical microscope
8. Polarizing Optical Microscope (Leica)
9. Confocal microscopy
10. Microfluidics Devices
11. Clean room facilities
12. Florescence spectra photometer
13. Circular dichroism spectrometer
14. Rheometer ARG2.
15. The Anton PaarPhysica Modular Compact Rheometer (MCR-501)
16. Differential Scanning calorimetry (Diamond DSC_PerkinElmer) and Differential Scanning calorimetry (DSC 8000_Perkin Elmer)
17. UV-Vis Spectrophotometer (Perkin Elmer) and UV-VIS Spectrometer (Ocean Optics)
18. FTIR Spectrum 1000 (Perkin Elmer).
19. Photoflorimeter
20. Nd:YAG Laser, Helium Neon Laser(632.8, 50mV), UV Source($\lambda=340$)
21. Electro Magnet (1.5 Tesla, Bruker) and Gauss meter
22. Micro Balance (0.1 μ g, Sartorius)

23. Oscilloscope: Pico Scope 6242,
24. Function Generator, Power Amplifier, Lock in Amplifier, Multimeter:
25. Vacuum pump and Spin Coating Unit
26. Thermal Evaporation and Sputtering.
27. Michelson Interferometer and Constant Deviation Spectrometer.

Reference: 1

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Reference: 2

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