

## Curriculum Vitae

### Current Position

DST-Inspire Faculty,  
Department of Physics, IIT Palakkad  
Email: [mayarani@iitpkd.ac.in](mailto:mayarani@iitpkd.ac.in)



### Personal Information

Date of Birth: December 15, 1990  
Nationality: Indian  
Gender: Female  
Languages: English (Fluent), Malayalam (Native),  
Konkani (Mother Tongue)

### Education:

Program	Institution	Year	Subjects	CG
Ph.D	Indian Institute of Technology Madras, India	2014-2019	Physics/ Experimental Soft Matter Physics	NA
One year course work during Ph.D.	Indian Institute of Technology Madras, India	2014-2015	Introduction to Macromolecules, Foundations in Theoretical Physics, Modern Techniques of Material Characterization, Foundations in Experimental Physics	8.5/10
Master of Science	Indian Institute of Technology Madras, India	2012-2014	Physics	8.5/10
Bachelor of Science	NSS College Cherthala, University of Kerala, India	2009-2012	Physics (Main), Mathematics (Subsidiary), Chemistry (Subsidiary)	9.9/10 <b>(Gold medal)</b>

### Research experience

**Postdoctoral researcher:** Soft Biophysics group, Laboratoire de Physique Théorique et Modèles Statistiques, Université Paris Saclay, 91405 Orsay. **(February 2020- December 2022)**

**Advisor:** Dr. Martin Lenz (University of Paris Saclay)

**Co supervisors:** Dr. Olivia Du Roure (ESPCI Paris) & Julien Heuvingh (ESPCI Paris & Université Paris Diderot)

**Senior Research Fellow:** Soft Materials Laboratory, Indian Institute of Technology, Madras, 600036, India (**August 2016- December 2019**).

**Advisor:** Dr. Dillip K. Satapathy

**Junior Research Fellow:** Soft Materials Laboratory, Indian Institute of Technology, Madras, 600036, India (**July 2014-July 2016**)

**Advisor:** Dr. Dillip K. Satapathy

### **Research Interests**

- Colloidal Self-assembly and its applications (evaporative assembly, assembly of complex shaped colloids and bio-inspired colloidal systems).
- Frustrated self-assembly.
- Properties of colloids at fluid-fluid interfaces and interfacial micro-rheology

### **Technical Skills**

- Two photon polymerization and 3D micro printing
- Optical microscopy (Bright Field and Fluorescence)
- Scanning Electron Microscopy: Involved in the installation, operation, upgradation and maintenance of the instrument at the department of Physics, IIT Madras, and also provide support to the user community.
- Drop shape analyser(Contact angle and Pendant drop tensiometry)
- Dynamic Light Scattering (DLS)
- Atomic Force Microscopy (Involved in the installation, operation, upgradation and maintenance of the instrument at IIT Madras, and also provide support to the user community.)
- Dino-lite microscope
- Thermo-gravimetry & Differential Scanning Calorimetry: Involved in the operation, upgradation and maintenance of the instrument at department of Physics, IIT Madras, and also provide support to the user community.

- Dielectric Relaxation Spectroscopy (DRS): Involved in the operation, up-gradation and maintenance of the instrument at department of Physics, IIT Madras, and also provide support to the user community.
- Synthesis of soft, polymer based colloidal particles.

### Software skills

- Experienced with 3D design application software such as Autodesk Inventor for designing nanostructures.
- Expertise in developing Matlab routines for different applications such as performing interaction calculations between colloidal particles, two-dimensional particle tracking, Mean-Square Displacement Analysis, Particle tracking micro-rheology, Voronoi analysis, image analysis etc.
- Well-versed in image analysis software such as ImageJ, Gwyddion and other application software including Origin, Latex, PovRay, Inkscape etc.
- Analysis of DRS data using Winfit

### List of Publications

1. **Mayarani, M.**, Madivala G. Basavaraj, and Dillip K. Satapathy, "Colloidal monolayers with cell-like tessellations via interface assisted evaporative assembly" Journal of Colloid and Interface Science **583** (2021): 683-691  
DOI:10.1016/j.jcis.2020.09.019
2. Merin Jose, **Mayarani, M.**, Madivala G. Basavaraj and Dillip K. Satapathy, "Evaporative self-assembly of the binary mixture of soft colloids", Physical Chemistry Chemical Physics **23**, (2021): 7115-7124.  
[DOI: 10.1039/D1CP00440A](https://doi.org/10.1039/D1CP00440A)
3. **M. Mayarani**, M. G. Basavaraj, and Dillip K. Satapathy, "On the origin and evolution of depletion zone in coffee stains" Soft matter **15** (2019): 4170-4177.  
[DOI:10.1039/c9sm00228f](https://doi.org/10.1039/c9sm00228f)
4. **M. Mayarani**, M. G. Basavaraj, and Dillip K. Satapathy. "Viscoelastic Particle–Laden Interface Inhibits Coffee-Ring Formation" Langmuir **34** (2018): 14294-14301.  
[DOI:10.1021/acs.langmuir.8b02739](https://doi.org/10.1021/acs.langmuir.8b02739)

5. **Mayarani, M.**, Madivala G. Basavaraj, and Dillip K. Satapathy, "Loosely packed monolayer coffee stains in dried drops of soft colloids" *Nanoscale* **9** (2017): 18798-18803. DOI: [10.1039/C7NR06732A](https://doi.org/10.1039/C7NR06732A)
6. **Mayarani, M.**, Merin Jose, Madivala G. Basavaraj, and Dillip K. Satapathy, "Order – to-disorder transition in colored microgel monolayers" *AIP Conference Proceedings* **2115** (2019): 030048  
DOI: 10.1063/1.5112887
7. Muthamilselvan, K., **Mayarani, M.**, Muralikrishna, G. M, Battabyal, M, and Gopalan, R, "Tuning the optical and thermoelectric properties of SrTi0.8-x Sn0.2FexO3" *Materials Research Express* **6** (2019): 045905.  
DOI: 10.1088/2053-1591/aafbd1

### **Mentoring and student engagement**

I have mentored six students during my PhD and one student during my postdoc which include two M.Sc. students for one year research project, and two summer internship student for three months each (during summer 2015 and 2016) and two higher secondary school students as part of a science project work carried out at IIT Madras in connection with Research Science Initiative- Chennai program-2018 and one bachelor's degree multidisciplinary cycle student (during postdoc). I also maintain a science blog for students called "Ram asks Radha didi", (<https://ramasksradhadidi.wixsite.com/website>) a blog focused on explaining science to young students and the public through simple language via storytelling and conversation sequences. I have interacted with various school students as a part of science day celebration in 2020 and introduced them to the blog. I also serve as a resource person for the "Telescience Scholar" program of the higher education department of Kerala, coordinated by Dr. T V Vimalkumar (assistant Professor ,Dept of Physics,St.Thomas' College,Thrissur,Kerala,India).

### **Awards/Fellowships**

- Indian Institute of Technology Madras, Institute Best Research Award, 2019.
- Best Presentation Award: at 4<sup>th</sup> International Conference on Nanomaterials: Synthesis Characterization and Applications, April-2019, MG University, Kottayam, Kerala, India.

- Best Presentation Award: at 3<sup>rd</sup> International Conference on Soft Materials, December-2018, Jaipur, Rajasthan, India.
- Best Poster Award (Sponsored by Soft Matter): at Jülich Soft Matter Days, November-2018, Jülich, Germany.
- Best Presentation award: at in-house symposium, Department of Physics, IIT Madras.
- Best Presentation Award: in 3-minute wonder presentation conducted by Vigyansala at IIT Madras - January, 2017.
- Best Presentation Award: in 3 minute competition conducted in association with Research Scholar's day, April - 2017, IIT Madras.
- Qualified CSIR- Junior Research Fellowship (All India Rank-120) by the University Grants commission and Council of Scientific and Industrial Research, Govt. of India, July 2016.
- Doctoral research fellowship awarded by Ministry of Human Resource and Development(MHRD), Government of India during the period from July 2014 up to July 2019.
- Qualified Graduate Aptitude Test in Engineering-GATE 2014 (Physics).
- Carried out summer research program at School of Physics, IISER Thiruvananthapuram during the summer 2013.
- Recipient of Sidvim scholarship from IIT Madras, for the academic year 2012-13.
- Qualified Joint admission Test for MSc (IIT JAM)-2012 (All India Rank-71).
- Recipient of Postgraduate Merit Scholarship for University Rank Holders (201214).
- BSc Physics Gold medallist from Kerala University (India) for having secured the highest mark in the University (99%, 2009-2012) [Topper among 1080 students].

### **Presentations in conferences and invited seminars**

1. **Mayarani, M**, “Understanding Protein Aggregation Using 3D Printed Colloids: Perspectives of an Experimentalist”, Invited talk at “Nano biomaterials and tissue engineering applications” conference organized by Mahatma Gandhi University,

Kottayam, India in association with Huazhong University of Science and Technology, China & Wuhan University, China and N.P. Ogarev National Research Mordovia State University, Saransk, Russia, on 25-27 October 2022

2. **Mayarani, M**, “Towards Understanding Frustrated Self-assembly Using 3D Printed Colloids - Perspectives of an Experimentalist”, expert lecture at National Institute of Technology, Calicut, 01 April 2022.
3. **Mayarani, M**, “Towards Understanding Frustrated Self-assembly Using 3D Printed Colloids”, at ‘Journées de Physique Statistique’, École Normale Supérieure de Paris, 27-28 January, 2022
4. **Mayarani, M**, “Towards Understanding Frustrated Self-assembly Using 3D Printed Colloids - Perspectives of an Experimentalist”, at the Theory Group Seminar, University of Warwick, UK (Invited talk delivered on 26/11/2021).
5. **Mayarani, M**, “Effect of depletion interaction on diffusion of colloids: A lesson learned from failure”, Journée Systèmes & Matière Complexes/Workshop on Complex Systems, École normale supérieure Paris-Saclay, France, Gif- sur-Yvette, France, 4<sup>th</sup> October-2021
6. **Mayarani, M**, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “On the origin and evolution of depletion zone in coffee-stains”, International Soft Matter Conference (ISMC 2019), University of Edinburgh, United Kingdom, 3<sup>rd</sup> -7<sup>th</sup> June – 2019 (Poster presentation)
7. **Mayarani, M**, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “Evaporation induced self-assembly in sessile drops containing soft microgels”, 4<sup>th</sup> International Conference on Nanomaterials: Synthesis Characterization and Applications (ICN 2019), Mahatma Gandhi University, Kottayam, Kerala, India, 12<sup>th</sup> – 14<sup>th</sup> April – 2019 (Oral Presentation)
8. **Mayarani, M**, Merin Jose, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “Order-to-disorder transition in colored microgel monolayers”, 63<sup>rd</sup> DAE Solid State Physics Symposium, Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India, 18<sup>th</sup> - 22<sup>nd</sup> December, 2018 (Poster Presentation).
9. **Mayarani, M**, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “Loosely packed self-assembled monolayers of soft polymeric microgels”, International Conference on Soft Materials (ICSM-2018), MNIT, Jaipur, Rajasthan, 9<sup>th</sup> - 14<sup>th</sup> December, 2018 (Oral Presentation).

10. **Mayarani, M**, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “Coffee-ring suppression through interfacial adsorption of colloids”, Jülich Soft Matter Days, Forschungszentrum Jülich, Germany, 20<sup>th</sup> - 23<sup>rd</sup> November- 2018 (Poster Presentation).
11. **Mayarani, M**, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “Evaporative self-assembly of soft colloids”, CompFlu-2017, IIT Madras, Chennai, India, 18<sup>th</sup> - 20<sup>th</sup> December-2017 (Poster Presentation)
12. **Mayarani, M**, Madivala G. Basavaraj, and Dillip Kumar Satapathy, “Evolution of order in self-assembled soft colloidal monolayers”, in-house symposium, department of physics, IIT Madras 3<sup>rd</sup> – 4<sup>th</sup> November – 2017 (Oral Presentation)
13. **M. Mayarani**, P. M. Geethu, and Dillip K. Satapathy, “Investigating the phase transition dynamics of linear pNIPAM in water-ethanol mixture”, International Conference on SoftMaterials (ICSM-2016), MNIT, Jaipur, Rajasthan, 12<sup>th</sup> - 16<sup>th</sup> December - 2016 (Poster Presentation).

## Reference contacts

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