KSYS Awardees 2019

Sl No.	Name	Address	Subject	Photograph
1.	Dr. Satheesh Chandran M	Scientist/ Engineer SE Polymers and Special Chemicals Division PSCG/PCM, Vikram Sarabhai Space Centre ISRO (PO) Thumba 695 022 Ph: 9048095890 satheeshchandran.m@gmail.com satheesh_chandran@vssc.gov.in	Material Science	
2.	Dr.Subramanyan Namboodiri Varanakkottu	Assistant Professor Dept. of Physics NIT Calicut Kozhikode 673 601 Ph: 8129736124 varanakottu@nitc.ac.in	Physical Science	
3.	Dr. Shijulal Nelson Sathi	Faculty Fellow (DST Inspire) Rajiv Gandhi Centre for Biotechnology Thiruvananthapuram 695 014 Ph: 9605278944 Shijulalns@rgcb.res.in	Cell and Bimolecular Science	

Dr.Satheesh Chandran M
Scientist/ Engineer SE
Polymers and Special Chemicals Division
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Presently the he is serving as Scientist/Engineer 'SE' in Polymers and Special Chemicals Division of Vikram Sarabhai Space Centre,Tiruvanantapuram. He has obtained his Ph.D. from University of Mysore in Polymer Science field. His current domain of research is in specialty polymers, composite materials and allied systems for all launch vehicle and satellite programs of ISRO.

Among the contributions to the Indian Space Program, the most significant one is the development and qualification of three new materials viz., (i) A high strength, low thermally conductive Lunar Thermal Probe material (ii) A very low thermally conductive potting compound and (iii) Pressure Sensitive Adhesive for Chandra's Surface Thermo Physical Experiment (ChaSTE) payload of Chandrayaan–2 mission. ChaSTE was indented for the in-situ thermal properties measurement in the polar/near-polar region on lunar surface**.** The potting compound was for isolating the temperature sensors from the probe main body for better temperature measurement accuracy. In Chandrayaan -2 mission, a successfully indigenized acrylate-based pressure sensitive adhesive was also used for the dust protection mechanism of ChaSTE.

Development and induction of indigenous Cyanate ester film adhesive for NASA-ISRO synthetic Aperture Radar (NISAR) airborne mission is a remarkable achievement. He has been successful in developing bismaleimide based high-performance specialty polymer matrix resins for composite applications. Apart from these, development materials such as high temperature performing film adhesive, high performing thermal protection systems for future space missions like Venus mission is also progressing.

Presently, he is involved in the qualification of highly mission critical Crew Module Thermal Protection system for 'Gaganyaan mission', the first human space flight mission of India.

Dr. Subramanyan Namboodiri Varanakkottu
Assistant Professor
Department of Physics
National Institute of Technology Calicut

Soft Matter encompasses a broad variety of systems (colloids, polymers, interfaces, gels, liquid crystals, surfactantsetc.) and phenomena (wetting, capillary phenomena, adsorptionetc.). Soft Matter objects and phenomena are also extraordinarily common in our everyday life (soap, cosmetics, medical/hygienic supply, food) as well as highly important in industry (pharmaceutics, cosmetics, polymer). All these components share the characteristics,such as;i) a reconfigurable character at room or body temperature (dramatic changes can be obtained with a mild stimulus, as very much exploited in liquid crystal displays, for instance); ii) highly dynamic assemblies. We, at NIT Calicut, focus on how light can be coupled with soft matter systems to realize reconfigurable optical elements, and sorting/assembly of nano- to macroscale objects.On a fundamental level, we explore how surface tension/capillary interactions can be tuned using external stimuli (light/temperature) for realizing controllable transport and programmable assembly of nano- to macroscale objects. We have also demonstrated how a liquid surface could act as a soft substrate for open surface droplet microfluidics. Towards applied aspects, we have developed an optofluidic multifunctional device, which could operate either as an optical switch or a tunable liquid lens, or have both the functions simultaneously *(Sensors and Actuators A: Physical 285, 659-665, 2019).*

Dr Shijulal Nelson Sathi,,
Faculty Fellow (DST Inspire)
Rajiv Gandhi Centre for Biotechnology
Thiruvananthapuram

By considering the enormous amount of genomic and metagenomic ‘Big-Data’ available in the public domain and generating the same using latest next generation sequencing technologiesDr. Shijulal Nelson-Sathiand his team at the Rajiv Gandhi Centre for Biotechnology is utilizing an integrated evolutionary genomics approach (interdisciplinary) to better understand origin, adaptation, transmission and evolution of antibiotic resistance among pathogenic bacteria. Previously he has shown that the lateral gene transfers (LGT/HGT) played a crucial role during microbial genome evolution and principle of gene acquisition in Archaea is corresponding to the origin of its major clades (Nelson-Sathi*el al.* PNAS 2012, Nelson-Sathi*et al.* PNAS 2015, Nelson-Sathi*et al.* Nature 2015). Later, the phylogenomic methods developed to analyze largescale genomic data were applied to *S. aureus*genomes and he was able to show that lateral gene transfers played a crucial role in shaping antibiotic resistance in *S. aureus*. Antibiotic resistant genes such as *blaZ*, *ble*, *kmA*, and *tetK* that are responsible for beta-lactam, bleomycin, kanamycin, and tetracycline resistance in *S. aureus* were laterally acquired from non-*Staphylococcus* sources (Jhon*et al.* GBE 2019).Most recently, he used culture independent shotgun metagenomic approaches to understand the environmental resistant gene pool (resistome) and its transfer potential to pathogenic bacteria.He has shown that flooded sites were heavily contaminated with multi drug-resistant strains of *Pseudomonas aeruginosa*, *Salmonella* Typhi/Typhimurium, *Klebsiella pneumoniae*, *Vibrio cholerae*(Divakaran, Philip *et al. microorganisms 2019).*In addition, he hadcontributed Big-Data analysis to various collaborative projects.

Relevance

Antibiotic resistance is a global threat. Current major challengeis to minimize the emergence and spread of antibiotic resistant bacteria and their transmission.As bacterial resistomes are shaped by acomplex array of evolutionary, ecological and environmental factors, research findings of Dr Nelson-Sathi provides insight into evolution of antimicrobial resistance which helps to design reasonable strategies for slowing down the resistance within pathogenic bacteria.

His current research activities at the Rajiv Gandhi Centre for Biotechnology is funded by INSPIRE Program, ECR programs of Department of Science and technology, RGCB intramural funding and an international collaborative grant from Heinrich Heine University of Düsseldorf, Germany.