

**Brief citations in respect of Scientists recommended by the  
Council for election to Fellows of Indian National Science Academy 2020  
(Effective from January 1, 2021)**

1. **Agarwal, Vivek** (b 13.06.1964), PhD, Professor, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai.

Professor Vivek Agarwal has made outstanding contributions in techniques for 'maximum power point tracking'; developed methods for extracting maximum amount of power from a solar cell array, especially under shaded conditions. This work created paradigms for future research on this topic. He has also made significant contributions in the area of power electronics applications for photovoltaic systems and in the improvements of power quality.

2. **Awasthi, Shally** (b 07.09.1958), MBBS, MD, Professor, Department of Pediatrics, King George's Medical University, Lucknow.

Professor Shally Awasthi has been recognized internationally for her research on respiratory infections in children, through studies in the hospitals and in the community to measure the burden, identify risk factors and test efficacies of interventions. Professor Awasthi works in the challenging environment of Uttar Pradesh and has successfully led studies that have resulted in the introduction of pneumococcal vaccines into the national programme. She has also carried out large long term trial on vitamin A supplementation and deworming and demonstrated that the national approaches to these public health efforts need modifications. .

3. **Ayappa, K Ganapathy** (b 28.08.1962), PhD, Professor and Chairman, Department of Chemical Engineering, Indian Institute of Science, Bengaluru.

Professor K Ganapathy Ayappa has brought out new insight in transport processes through his investigations on binary mixture adsorption in carbon nanotubes, dynamics of water confined between graphene oxide surfaces and pore formation in biological membranes. These will have long lasting impact. He has consistently produced a substantial body of high-quality work.

4. **Batra, Janendra Kumar** (b 28.01.1957), PhD, Professor and Head, Department of Biochemistry, School of Chemical and Life Sciences, Jamia Hamdard, New Delhi.

Dr Janendra Kumar Batra has made outstanding contributions in the understanding of the control of protein quality in Mycobacterium tuberculosis under stress. He also has made seminal contributions in the area of basic biology of naturally occurring protein toxins and their application in developing bio-therapeutics.

5. **Bhattacharyya, Suvendra Nath** (b 04.10.1975), PhD, Senior Principal Scientist and Head, Molecular Genetics Division, CSIR-Indian Institute of Chemical Biology, Kolkata.

Dr Suvendra Nath Bhattacharya's work has uncovered the manner in which human cells sense their environments and control cellular microRNA levels and their activities by exporting excess microRNAs. He discovered the key protein, HuR that controls microRNA-loading into exosomes. His research elucidated a process by which the India-centric pathogen Leishmania donovani modulates microRNA machineries in the host tissue during infection for its own survival. These open up novel possibilities for therapeutic strategies against the pathogen.

6. **Bhattacharyya, Tirthankar** (b 07.02.1968), PhD, Professor, Department of Mathematics, Indian Institute of Science, Bengaluru.

Professor Tirthankar Bhattacharyya is an expert on multivariable operator theory and works on its deep interactions with several variable complex function theory. He has made fundamental contributions to the model theory of operators and has firmly established himself as an authority on the subject of model theories for the symmetrized bi-disk and the tetra block.

7. **Chatterjee, Subhadeep** (b 25.05.1975), PhD, Staff Scientist- V (Group Leader), Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad.

Dr Subhadeep Chatterjee has made landmark contributions through his work on bacterial quorum sensing heterogeneity. This has enabled an improved understanding of social communication systems by providing insights on microbial iron homeostasis and its role in plant diseases.

8. **Dhar, Abhishek** (b 31.08.1970), PhD, Professor (H), International Centre for Theoretical Sciences, TIFR, Bengaluru.

Professor Abhishek Dhar has made fundamental contributions to studies of non-equilibrium statistical physics, in particular on the breakdown of the Fourier law of heat conduction in one dimension, as also in the use of the quantum Langevin equation, and in studies of non-equilibrium fluctuation theorems. He is internationally recognized as a leader in these fields.

9. **Ghate, Eknath Prabhakar** (b 11.09.1969), PhD, Professor, School of Mathematics, Tata Institute of Fundamental Research, Mumbai.

Professor Eknath Ghate works on various topics in Number Theory that relate to arithmetic of automorphic forms,  $p$ -adic Galois representations and the special values of  $L$ -functions. He has been making noteworthy contributions consistently with publications in highly acclaimed journals such as *Compositio Math*, *Indag. Math*, *Trans. Amer. Math. Soc*, *Math. Res. Letters*.

10. **Ghosh, Pradyut** (b 17.02.1970), PhD, Senior Professor and Chair, School of Chemical Sciences, Indian Association for the Cultivation of Science, Kolkata.

Professor Pradyut Ghosh has made substantial contributions through his work on anion recognition. This has potential applications in the area of chemical sensing, water purification, health and environment. His investigations on interlocked molecular systems with has implications for molecular machines.

11. **Habib, Saman** (b 16.08.1968), PhD, Senior Principal Scientist & Professor (AcSIR), Division of Molecular & Structural Biology, Central Drug Research Institute, Lucknow.

Dr Saman Habib has made phenomenal contributions towards an understanding of biological processes in the apicoplast of Plasmodium, a small plastid-like organelle and a potential drug target. She has elucidated the properties of ribosomes and proteins specific to translation and replication and also delineated components of the unique SUF pathway of [Fe-S] biogenesis and other pathways of apicoplast and mitochondria in the malarial parasite.

12. **Haritsa, Jayant Ramaswamy** (b 10.03.1964), PhD, Professor (HAG Scale), Department of Computational & Data Sciences, Indian Institute of Science, Bengaluru.

Professor Jayant Haritsa has contributed to the theory and practice of database engines. These efforts have spanned both the transaction-processing and decision-support environments and breaks new ground in real-time databases, data mining, XML-, multi-lingual and biological- databases and query optimization. His work in the area of query optimization and related plan diagrams culminated in a visualization platform called Picasso is commercially available and widely used by leading companies like MSR, HPLabs, IBM and leading academic groups. in universities like CMU, Purdue, Duke, NUS, IIT Bombay etc. His work on integrating issues of efficiency and data-integrity in Real Time Databases revolutionized the area. He is among a few researchers whose work straddle the entire spectrum of mathematical modeling of real life-problems to practical and provably superior performance. Explicit evidence of the practicality of these ideas was demonstrated through incorporation of the Postgre SQL kernel in advanced courses in Databases around the world.

13. **Jayananda, Mudlappa** (b 01.07.1959), PhD, Professor, Centre for Earth, Ocean and Atmospheric Sciences, University of Hyderabad, Hyderabad.

Professor Jayananda has made fundamental contributions to the understanding of the evolution of the Dharwar Craton during 3.5 to 2.5 Ga, in respect of the growth of craton, its architecture, magmatism, and tectonics. This work has contributed globally to the tectonics during early Earth, the coupled crust-mantle system, and, the development of Archean cratons.

14. **Laxmi, Ashverya** (b 28.12.1974), PhD, Staff Scientist- V, National Institute of Plant Genome Research, New Delhi.

Dr Ashverya Laxmi has carried out seminal work on the cross-talk between multiple signalling pathways for plant growth and development. Her research provides novel insights on the role of glucose as a major signalling molecule and its interaction with hormone pathways to control plant architecture and stress response.

15. **Mahapatra, Souvik** (b 26.10.1970), PhD, Professor, Department of Electrical Engineering, Indian Institute of Technology Bombay, Mumbai.

Professor Souvik Mahapatra has made seminal contributions towards understanding fundamental factors in degradation in CMOS devices. His work on reliability characterization methodologies has been groundbreaking. He has successfully identified the physics leading to the reliability of a semiconductor device and the mechanism of their degradation to factors such as bias-temperature instabilities (BTI). He connected this physics to develop compact predictive models that are used widely in the semiconductor devices industry.

16. **Minwalla, Shiraz Naval** (b 02.01.1972), PhD, Senior Professor (I), The Department of Theoretical Physics, Tata Institute of Fundamental Research, Mumbai.

Professor Shiraz Minwalla's seminal contributions have shaped global research in a numerous topics in quantum field theory, gravity and string theory. His work includes the influential fluid-gravity duality derived from fluid dynamical equations from Einstein's equations in anti-de Sitter space-time. More recently, his solution of large N Chern-Simons matter theories in 2+1 dimensions and identification of the novel Bose-Fermi duality of these systems are important contribution to theoretical condensed matter physics.

17. **Mukhopadhyay, Arnab** (b 20.07.1972), PhD, Staff Scientist-VI, Molecular Aging Laboratory, National Institute of Immunology, New Delhi.

Dr Mukhopadhyay has made fundamental contributions on the molecular basis of aging. Employing a model organism, his studies have discovered a critical role of nutrient sensing pathways and have also unraveled the complex gene regulatory mechanisms by which dietary restriction affects aging.

18. **Nagaraju, Ganesh** (b 30.04.1973), PhD, Associate Professor, Department of Biochemistry, Indian Institute of Science, Bengaluru.

Professor Ganesh Nagaraju's work identified that XRCC3 S225 protein phosphorylation is crucial for DNA double-strand break (DSB) repair by HR and intra-S-phase checkpoint regulation as well as maintenance of genome integrity. He demonstrated that tumor suppressor functions of RAD51 paralogs, FANCD1 helicase type of proteins play a critical role in genome maintenance. His work provides a deep insight on the molecular mechanisms of pathological mutations leading to genetic diseases and cancer, which can be translated into developing new therapeutics for targeting cancer pathology.

19. **Narain, Sunita** (b 23.08.1961), DSc (Hon), Director General, Centre for Science and Environment, New Delhi.

Dr Sunita Narain is an unmatched environmentalist of India, a fearless writer on issues of environment and policies. She has co-edited influential publications on India's environment, directed campaigns on air pollution control, community water management, pesticide regulation, plastics to name a few. The biweekly magazine, edited by her, Down to Earth, has been one of the most acclaimed environmental magazine of India and is also acclaimed internationally. She combines science-based evidence and solutions with a pro-poor perspective to mainstream environmental concerns. Her ideas have been widely acclaimed and have led to slew of policy and regulatory measures, that are rooted in the concept is that the environmental protection is a necessary precursor to sustainable future.

20. **Nayak, Shailesh** (b 21.08.1953), PhD, Director, National Institute of Advanced Studies, Indian Institute of Science Campus, Bengaluru.

Dr Nayak has made unparalleled contribution in developing geoscience services for improving quality of lives of coastal communities by enhancing their income, security and safety. His two major technological contributions to India are, a) the design, development of the Tsunami Early Warning Center and in making it failsafe through generation of about 50,000 scenarios and, b) the use of satellite data to understand ocean processes and in developing in their use to identify potential fishing grounds. This unique contribution has transformed lives and economies of fishermen in India. The Tsunami warning system is being used by 22 countries in the Indian Ocean. He has used Space technology for Coastal Regulation Zone by providing data on tides, health of mangroves, brackish water aquaculture sites. His coastal maps are used by the courts of India.

21. **Nitsure, Nitin** (b 09.11.1957), PhD, Professor (H), School of Mathematics, Tata Institute of Fundamental Research, Mumbai.

Professor Nitin Nitsure has made substantial contributions in the area of geometry of vector bundles on curves. His algebraic construction of the Hitchin moduli space was the forerunner for the fundamental work of Carlos Simpson. His later work on logarithmic connections and the Riemann Hilbert correspondence is considered as a fundamental contribution in mathematics. He was invited to write a modern exposition of Grothendieck's classic *Fondements de geometrie algebrique*.

22. **Pucadyil, Thomas** (b 20.11.1976), PhD, Associate Professor, Indian Institute of Science Education and Research, Pune.

Dr Thomas Pucadyil's research has significantly advanced our understanding of the manner in which cellular membranes are sculpted and cut. His pioneering work using a novel in vitro assay elucidated membrane deformation by proteins, and how they promote and catalyse the budding and fission process, that are central to the biology of eukaryotic cell membranes.

23. **Raghava, Gajendra Pal Singh** (b 25.05.1963), PhD, Professor, Center for Computational Biology, Indraprastha Institute of Information Technology (IIIT), New Delhi.

Professor GPS Raghava has made innovative contributions towards applications of machine learning to address a variety of problems in computational biology. These range from prediction of secondary structure, cellular localization, B-cell/T-cell epitopes, ligand binding sites, vaccine/drug design and many more. Prof. Raghava ranks among few international researchers who have developed a large number of bioinformatics resources which are extensively cited and widely used for data driven research in biology.

24. **Raghunathan, Velayudhan Anandavally** (b 25.11.1960), PhD, Professor, Raman Research Institute, Bengaluru.

Professor VA Raghunathan has made important contributions to the study of multilayer lipid membranes and liquid crystals using specialized x-ray scattering measurements. He has discovered novel structures of lipid membranes some of which disproved long-standing theoretical predictions. It is remarkable that he has also contributed significantly to a theoretical understanding of many of these systems.

25. **Ravikanth, Mangalampalli** (b 04.06.1966), PhD, Professor, Department of Chemistry, Indian Institute of Technology Bombay, Mumbai.

Professor Ravikanth, Mangalampalli has made significant contributions to core-modified porphyrin chemistry through development of synthetic methods for functionalized core-modified porphyrins and porphyrin arrays that mimic photonic wires. He has also made noteworthy explorations to BODIPY chemistry.

26. **Reddy, Manjula** (b 06.02.1965), PhD, Scientist, CSIR- Centre for Cellular and Molecular Biology, Hyderabad.

Dr Manjula Reddy has made sustained and pioneering contributions to the studies on microbial genetics and physiology. Her research on the highly redundant system of bacterial cell-wall synthesis has provided ground breaking insights on cell growth. The findings are significant as they can be leveraged for the development of newer classes of antibiotics.

27. **Roy, Rahul** (b 24.0.1959), PhD, Professor, Indian Statistical Institute, New Delhi.

Professor Rahul Roy has made novel contributions in the areas of continuum percolation, stochastic geometry and random graphs. His contributions have settled several long standing conjectures in statistical physics. His book on Continuum Percolation is now a standard reference for researchers in probability, physics and wireless communications.

28. **Sain, Kalachand** (b 05.02.1964), PhD, Director, Wadia Institute of Himalayan Geology, Dehradun.

Dr K Sain has made decades of sustained research on Gas Hydrates in the country, has established a world class facilities for inversion modelling and for interpretation of geophysical data including 2D- full waveform tomography for wide angle seismic data. He established neural network based approach for interpretation of sub surface geophysical features. He also characterized gas hydrate reservoirs, in the Krishna-Godavari, Mahanadi and Andaman basins and used seismic data to estimate critical parameters of porosity, permeability and pore pressure. These were later verified by drilling and coring.

29. **Sankaran, Mahesh** (b 10.02.1967), PhD, Professor, National Centre for Biological Sciences, Tata Institute of Fundamental Research, Bengaluru.

Professor Mahesh Sankaran has provided a new framework for hitherto misunderstood functioning of savanna ecosystems across the world. He identified the roles of ecological factors such as water, fire and herbivory, *i.e.* resources versus disturbance, in structuring savanna vegetation, and understanding how these ecosystems would respond to future global change factors especially droughts.

30. **Sastry, Garikapati Narahari** (b 17.01.1966), PhD, Director, CSIR-North East Institute of Science & Technology, Jorhat.

Professor GS Narhari has made outstanding contributions in the area of non-covalent interactions, pi hydrogen bonds, cooperativity among non-bonded interactions, computational drug design and has initiated of the indigenous development of software - Molecular Property Diagnostic Suite.

31. **Sengupta, Krishnendu** (b 31.03.1970), PhD, Professor, Theoretical Physics Department, Indian Association for the Cultivation of Science, Kolkata.

Professor Krishnendu Sengupta has made pioneering contributions in a varied range of areas in condensed matter physics such as non-equilibrium dynamics of quantum systems, zero bias conductance peak, fractional AC Josephson effect in topological superconductors, transport in graphene and superfluid-insulator transitions. Many of his predictions were later confirmed experimentally.

32. **Shouche, Yogesh** (b 24.10.1960), PhD, Scientist G, National Center for Science, Pune.

Dr Yogesh Shouche is a renowned microbiologist in microbial diversity and taxonomy. He has established and curated a national culture collection of rare microbial wealth of the nation. He has pioneered work on insect microbiomes and is currently leading the Human Microbiome project in the country.

33. **Singh, Krishna Nand** (b 12.06.1962), PhD, Professor of Organic Chemistry, Department of Chemistry, Institute of Science, Banaras Hindu University, Varanasi.

Professor SK Nand has contributed to development of innovative and inexpensive organic synthetic methodologies for important and useful structural frameworks of medicinal relevance.

34. **Singh, Pradhyumna Kumar** (b 31.08.1968), PhD, Senior Principal Scientist, Plant Molecular Biology and Biotechnology Division, CSIR- National Botanical Research Institute, Lucknow.

Professor PK Singh has made outstanding contributions towards identification of novel molecules and approaches to control pests in field crops. His work provides a complete model, from discovering new proteins to genes, making synthetic genes to develop transgenic crop lines and their performance evaluation. Transgenic cotton lines expressing three different novel genes (cry, tma12 and msc14) developed by his group provide next-generation insecticidal approaches for control of insect pests. His work provides rare research procedures developed complete in India.

35. **Srivastava, MV Padma** (b 07.03.1965), MD, DM, Professor, Department of Neurology, CN Centre, All India Institute of Medical Sciences, New Delhi.

Professor Padma Srivastava is a neurologist. She setup and implemented the National Stroke Registry and the National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases and Strokes. At AIIMS, she started hyperacute reperfusion strategies and contributed to a comprehensive epilepsy programme that raised the bar for clinical and public health management of these conditions in India. Driving change in the health administration in India is not simple, and Professor Srivastava's efforts as a researcher translating her findings into policy have made a huge impact to the management of common neurological problems appropriately and at scale.

36. **Tripathi, Sachchida Nand** (b 24.07.1971), PhD, Professor, Department of Civil Engineering, Indian Institute of Technology, Kanpur, Kanpur.

Professor Sachida Nand Tripathi has made his outstanding and innovative contributions to modelling, measurement and analysis of aerosols, fog and clouds; measurements of brown carbon refractory indices, and in aerosol-cloud interactions over the Indian monsoon region.

37. **Vrati, Sudhanshu** (b 19.03.1960), PhD, Executive Director, Regional Centre for Biotechnology, Faridabad.

Professor Sudhanshu Vrati, has made outstanding contributions to studies on the biology and pathogenesis of Japanese Encephalitis Virus, developed viral vectors for vaccine research and a candidate vaccine for JEV, which was licensed to an Indian company. He also established the first cGLP-compliant facility in an Indian academic institution to test vaccine efficacies, and developed validated assays for clinical development of the Rotavirus vaccine - the first licensed vaccine to be indigenously developed in India.

38. **Yadav, Om Parkash** (b 16.05.1963), PhD, Director, ICAR- Central Arid Zone Research Institute, Jodhpur.

Professor OP Yadav, has made consistent contributions to the understanding of strategies for crop breeding for water stressed, dryland environments. He identified a number of breeding materials and released nearly 12 widely grown cultivars of pearl millet and maize. He developed two pearl millet hybrids based on male sterility and restorer system and six single cross hybrids of maize, suitable for different agroclimatic zones. His work also identified lines of maize for charcoal rot resistance and introgressed in QPM background.

39. **Yajnik, Chittaranjan Sakerlal** (b 31.01.1952), MD, Director, KEM Hospital Research Centre, Pune.

Professor Chittaranjan Yajnik has made outstanding contributions towards understanding the high susceptibility of Indians to diabetes and related disorders. His discoveries have led to a change in thinking about the aetiology of type 2 diabetes. While previously considered a 'degenerative' condition, his work has highlighted the important component of 'reduced capacity' caused by impaired early development. This work has brought a major change in public health attitudes and policies for care during pregnancy. He is internationally acclaimed for his description of the 'thin-fat' Indian, which describes the fact that though not obese by international criteria, Indians have high percent of body fat. Professor Yajnik has demonstrated a possible role for maternal micronutrient nutrition in its aetiology. This has placed Indian science on the world map of understanding, mitigating and managing diabetes.