Indian Academy of Sciences elects new Fellows—1994

Ananthakrishna, G., Materials Research Centre, Indian Institute of Science, Bangalore

His work has centered around applying statistical and nonlinear dynamical methods to problems bordering materials science and condensed matter physics. New methods of approach have been introduced. Examples are master equation approach to the problems such as clustering of point defects, extended defects, dislocation dynamics, and bifurcation theory for the study of instabilities in plastic flow. He has also made substantial contribution to electronic properties of quasi-crystals, problems in chaos, stochastic processes and more recently, earthquake dynamics and friction.

Anil Kumar, Department of Physics, Indian Institute of Science, Bangalore

He has developed a number of experimental techniques to unearth and characterize multi-critical points in ternary and quaternary liquid mixtures. His endeavours led to a deeper comprehension of the nature of the following multicritical points: a tricritical point, a double critical point and a quadruple critical point. He was instrumental in uncovering the reversible flocculation of colloids in re-entrant liquid mixtures. He performed the first set of experiments that were directed at quantifying the unusually large 1/f noise near a consolute (T_c) in binary fluid mixtures.

Chakravarty, A. R., Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore

Oxo-hydroxo-carboxylate bridged dimetal complexes have drawn considerable current interest as models for the active sites of several metalloproteins. Complexes containing such structural units have generated new classes of inorganic complexes. One such class has a tribridged (μ-oxo)(μ-carboxylato) dimetal core. The dinutemum chemistry of this core has been developed by his group. Several dimeric and higher nuclearity copper(II) complexes are also synthesized and structurally characterized. His achievements also include the synthesis and structural characterization of an air-stable and water-soluble chiral organometallic aqua complex suitable for asymmetric induction studies of organic substrates.

Chattopadhyay, K., Department of Metallurgy, Indian Institute of Science, Bangalore

He has worked on synthesis of new materials by nonequilibrium processing including the early reports on aluminium-based metallic glass and metastable phases, discovery of one- and two-dimensional quasicrystals as well as possibility of ordering and approximant phases. He has made experimental studies on the phenomenon of immiscibility including the role of critical points in the evolution of ordering and clustering in solid state, liquid state immiscibility and morphology development with increasing departure from equilibrium. His current studies include synthesis and transformations in nano-scaled stable and metastable materials including the phenomenon of superheating, heterogeneous nucleation and the problem of evolution of equilibrium and growth shapes.

Dutta, Bhaskar, Indian Institute of Astrophysics, Bangalore

His main research concerns neutron stars; the topic includes the formulation of the equation of state, the effect of quark matter on the cooling of neutron stars, general relativistic effects of rotation on the structure and radiation characteristics of neutron stars and the evolution of their magnetic fields. He derived nuclear partition function and showed the importance of Pauli exclusion principle of gravitational collapse of stars. His work in the area of astro-particle physics involves derivation of a lower bound on the ax ion rest mass, the role of QCD phase transition on primordial nucleosynthesis and derivation of a lower limit on quark compositeness energy scale. He also showed that the ratio of photon to muon pair productions can serve as an efficient signal for formation of quark plasma in heavy-ion collisions.

Ganguly, N. K., Department of Experimental Medicine and Biotechnology, Post Graduate Institute of Medical Education and Research, Chandigarh

His main work is in pathophysiology of diarrhoeal diseases and he has proposed a common mechanism of secretory diarrhoea for a number of diarrheogenic pathogens including bacteria and parasites. He has proposed central calcium control of secretory diarrhoea involving protein kinase C and arachidonic acid synergism. His other contributions in the area describe the adhesions identifying the receptors and understanding of the gut community.

Hasnain, S. E., National Institute of Immunology, New Delhi

His contributions revealed important components in the regulation of baculovirus-mediated gene expression in insect cells and live caterpillars. He showed the existence of a secretory load in this system for proteins which undergo extensive post-translational modifications and further demonstrated that this can be circumvented by advancing the time of...
expression using temporally different promoters thereby suggesting that it is the temporal nature of the promoter, and not absolute strength, which determines the quantitative and qualitative expression of proteins of enhanced biological activity. He developed a model for pre-determining the expression level of an unknown gene in the baculovirus system. His hypothesis for explaining genetic hypervariability culminated in the development of novel DNA fingerprinting probes which continue to be used in forensic medicine.

Iqbal, Javed, Department of Chemistry, Indian Institute of Technology, Kanpur

He has made notable contributions on the cobalt-mediated synthesis of organic compounds which are otherwise difficult to obtain by conventional routes. This aspect is found to be versatile in the organic synthesis and has already made inroads in the preparation of novel organic compounds.

John, P. L., Institute for Plasma Research, Gandhinagar

He has performed experiments on laboratory simulation of electrojet instabilities, soliton interactions with sheaths, injection of pulsed electron beams in mirrors and toroids and physics of toroidal non-neutral traps. He provided leadership in the design, fabrication and commissioning of tokamak ADITYA and explored a series of plasma technologies for industrial purposes.

Kailas, S., Nuclear Physics Division, Bhabha Atomic Research Centre, Bombay

He has made important contributions in proton-nucleus optical potentials at sub-coulomb energies, nuclear giant resonances and heavy ion reactions. Using the van de Graaff accelerator he made extensive measurements of the \( p, n \) reaction cross-sections for medium mass nuclei. He has recently been pursuing an extensive study of heavy ion-induced fission reactions using the Pelletron accelerator.

Karthi, C. C., Division of Cellular and Molecular Cardiology, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram

He has distinguished himself by his many contributions to the highly focused investigations of endomyocardial fibrosis, a tropical human cardiomyopathy. His studies have disengaged the aetio-pathogenesis of the disease from a confusing network of hypotheses involving hyperesinophilia and autoimmunity and placed it in the context of a geochemical cause. His original works have also led to focus attention on the role of cardiac fibroblasts in the pathogenesis and to the suggestion that endomyocardial fibrosis is an interstitial heart disease. He has also succeeded in inducing myocardial lesions in rabbits similar to those in human disease.

Mandal, A. B., Chemical Laboratory, Central Leather Research Institute, Madras

He has made significant contributions in the area of monolayer assemblies and reverse micellar systems. His work mainly involves collagen, peptides, synthetic and vegetable tanning materials and polymeric surfactants.

Nag, Subhashis, The Institute of Mathematical Sciences, Madras

He has done work in complex analytic geometry and the theory of moduli of Riemann surfaces, especially the discovery of the fundamental relationship of the universal Teichmüller space to non-perturbative string theory. He has discovered the completely natural connection between the diffeomorphism group of the circle and the Teichmüller spaces, thereby he deduced a form of the Mostow rigidity theorem as a corollary, and went on to find the universal version, living on the universal Teichmüller space, of the classical period mapping of AbelJacobi (that associates to each Riemann surface its period matrix).

Naqvi, S. W. A., National Institute of Oceanography, Goa

He has carried out extensive research on chemical oceanography of the northern Indian Ocean, particularly carbon-nitrogen transformations in suboxic waters. He has estimated water-column denitrification rate in the Arabian Sea following novel techniques, and provided evidence for large seasonal changes in denitrification regime. He has demonstrated rapid renewal of oxygen-depleted layer from chemical and enzymatic measurements. He quantified subsurface respiration rates in the northwestern Indian Ocean and showed that sinking organic carbon flux is severely inadequate to meet the carbon demand. He discovered an intermediate nepheloid layer associated with denitrification in the Arabian Sea and proposed a new mechanism for its formation.
Panda, S. K., Department of Pathology, All-India Institute of Medical Sciences, New Delhi

He cloned the Indian strain of the virus, expressed all the structural and non-structural proteins, developed diagnostic ELISA. He identified receptor for HBV and its 'S' transactivator associated with majority of hepatocellular carcinoma. He cloned and sequenced major parts of HCV, and identified a new subtype (III C) from India. He also cloned and sequenced Indian strain of chick hepatitis B virus. He developed an animal model for anti-Hepadna virus drug testing.

Patwardhan, V. S., Chemical Engineering Division, National Chemical Laboratory, Pune

His main interest has been the application of mathematical modelling and computer simulation techniques to different areas in chemical engineering. He has developed a new expression for the excess free energy of aqueous single electrolyte solutions, and developed a unified approach for predicting the properties of mixed electrolyte solutions. He has developed a Markov-chain based approach for describing the diffusion in zeolites. He has developed a procedure for studying the sensitivity of heat exchanger networks which is computationally very efficient. He has developed the concept of apparent porosity which explains some unusual phenomena in fluidization of mixed particle systems. He has evolved a procedure that accounts for the stagnant zones in gas absorbers in a quantitative manner.

Prakash, V., Central Food Technological Research Institute, Mysore

He has made significant contributions in the area of structure-function relationship of seed proteins. He has proposed the structural homology theory of seed proteins of both high and low molecular weight protein fraction from a number of seeds. This has contributed to our understanding of quaternary structure of seed proteins.

Prasad, D., Mehta Research Institute for Mathematics and Mathematical Physics, Allahabad

His work has mostly been related to understanding decompositions of representations of groups over local fields when restricted to subgroups in terms of certain arithmetic data. Several results obtained or conjectured to exist bring out the importance of what are called 'epsilon factors' for such questions. Recently, he has been interested in the Weil representations and theta liftings and in one of the papers he has interpreted the lifting of representations so obtained via Langlands' principle of functionality, and in another obtained branching laws using the seesaw duality in Weil representations.

Ranganath, H. A., Department of Zoology, University of Mysore, Mysore

He is a researcher in population genetics and has demonstrated the pattern of genetic divergence in different groups of Drosophila by integrating the classical and molecular cytogenetics, hybridization, behaviour, ecogenetics, fitness, and isozyme studies. These studies have the evidence for the genetic transience mode of speciation and for the evolution of homospecific species. Also, he has established the Drosophila Stock Centre at Mysore as a National Resource Facility.

Ray, D. S., Department of Physical Chemistry, Indian Association for the Cultivation of Science, Calcutta

His research activities are in the area of nonlinear dynamics, quantum optics and theoretical spectroscopy. Isomorphism of Lorenz equations for turbulence with three-wave mixing equations, stability aspects of Schrödinger-Maxwell equations in quantum optics, non-equilibrium statistical mechanical description of chaos, generalization of master equation in quantum optics for nonlinear systems and non-Markovian processes with application to ultrafast and multiphoton processes, localization problems in nonlinear optics are some of the aspects addressed by him in optics, spectroscopy and nonlinear dynamics.

Rodrigues, V., Molecular Biology Unit, Tata Institute of Fundamental Research, Bombay

She is interested in mechanisms underlying the function and development of the chemosensory systems in Drosophila melanogaster.
Sen, Abhijit, Institute for Plasma Research, Gandhinagar

His major contributions have been in the theory of instabilities and nonlinear wave interactions in tokamak devices. He elucidated the role of edge density fluctuations in the anomalous scattering of lower hybrid waves, suggested a novel scheme for stabilization of tokamak ballooning instabilities by RF ponderomotive forces and toroidal rotation effects and discovered a new class of exact nonlinear stationary solutions with applications to short intense laser pulses and free electron lasers. He also worked on relativistic electron beams, dusty plasmas and basic aspects of nonlinear dynamics which are related to fundamental questions in turbulence and nonlinear coherent states.

Sivasanker, S., Catalysis Division, National Chemical Laboratory, Pune

He has made contributions in the science and practice of industrial catalysis. A novel breakthrough ‘green’ process for linear alkyl benzene and development of high tech catalysis are specially noteworthy.

Sri Niwas, Department of Geophysics, Kurukshetra University, Kurukshetra

He has made novel contributions to the difficult task of interpreting geoelectric data through a creative new development of the matrix method evolved by integrating the theory of exponential approximation of a rational function, the properties of the Lipschitz integral and the theory of minimum norm inversion, that enables transformation of apparent resistivity data into resistivity kernel in a most elegant way.

Sridharan, R., Physical Research Laboratory, Ahmedabad

He has made very significant contributions in the field of the electrodynamics of the earth’s atmosphere, particularly the structure and energetics of the equatorial thermosphere and its response to dynamical forcings. The development of the state-of-art Fabry–Perot spectrometer for measurement of thermospheric temperatures and winds, has given new results on the interaction between the ionized and neutral components of the earth’s atmosphere. The recently developed dayglow photometer capable of measuring features of minute fraction of the background is a major breakthrough in observational techniques, and measurements made have helped in understanding the relative importance of different mechanisms for emission of dayglow in the atmosphere.

Subrahmanyan, N. C., School of Life Sciences, University of Hyderabad, Hyderabad

He pioneered the techniques of chromosome elimination in barley for the production of haploids. This method has also been adopted for other plants. He further showed that the ratio of the parental genomes in the zygote determines the chromosome elimination or stability. He has done extensive work on the cistrons and identification of cryptic satellite DNAs and discovered a ‘hemizygous’ ineffective control of chromosomes in barley.

Sunder, R., Bangalore Integrated System Solutions (P) Limited, Bangalore

He has contributed to the development of fatigue loading standard for IAF combat aircraft and adaptation of electron and optical microscopy to characterize fatigue crack growth and crack closure phenomenon. His work has involved discovery of hysteresis in crack closure, development of servo hydraulic test technology and its automation, adaptation to requirements of Indian R&D centres and industry in the area of material and product evaluation for strength and endurance.

Swarup, Ghanshyam, Centre for Cellular and Molecular Biology, Hyderabad

He is the first to initiate research on protein tyrosine phosphatase, showing homology to transcription factors binding to DNA. The functional diversity of these phosphatases arises from their regulation of tyrosine kinases, potential for autophosphorylation and ability to bind DNA.

Thiagarajan, P. S., School of Mathematics, SPIC Science Foundation, Madras

He has done extensive work in the theory of Petri nets, including the formulation and study of the basic system model called elementary net systems, investigations on the relationship between various models of distributed systems such as net systems, transition systems, Mazurkiewicz trace languages and event structures. His main interest and contributions during the last five years have been on temporal and modal logics based on partial order executions of distributed systems.

Tyagi, A. K., Department of Biochemistry, University of Delhi South Campus, New Delhi

His earlier work led to the understanding of mechanism of action of L-alanine, an antibiotic anticancer agent. His work on the role of polyamines in killer systems of S. cerevisiae demonstrated that the requirement of polyamines for the
maintenance and replication of double-stranded RNA killer plasmids is specific in nature. His work on transcriptional signals of mycobacteria revealed the divergence of mycobacterial transcriptional machinery from those of other bacteria. Several vectors have been generated for study of molecular genetics and gene expression in mycobacteria. He discovered a new gene which has importance in the pathogenesis of *M. tuberculosis*.

Wadhwa, Shashi, Department of Anatomy, All-India Institute of Medical Sciences, New Delhi

Critical time periods in the development of human retina, lateral geniculate body and visual cortex in the visual pathway have been identified by studying the chronology of development of proliferation, migration, cell death, dendritic growth, synaptogenesis and neuro-transmitter profiles. The morphology of cerebellar nuclei in adult monkeys has been studied and their sequential ontogenetic development elucidated in human fetuses. Development of neutrophilic infiltration of the human urinary bladder and rat heart has been analysed immunohistochemically.

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**Publications received**

*Books received by the journal in 1994 but not reviewed are listed. The list is intended to serve as both a notice of the books and an acknowledgement of receipt.*


**Elements of Biotechnology:** P. K. Gupta, Rastogi Publications, 'Gangotri', Shivaji Road, Meerut 250 002. 1994, 602 pages, Rs 105.


**Science and Society: Some Perspectives:** Yash Pal *et al.* (eds). Gyan Publishing House, 5, Ansari Road, New Delhi 110 002. 1993, 405 pages, Rs 400.

**Snakes of Medical Importance and Snake-Bite Treatment:** Indramani Jena and Akulananda Sarangi. Ashish Publishing House, 8/81, Punjabi Bagh, New Delhi 110 026. 1993, 293 pages, Rs 500.


