

# Shanti Swarup Bhatnagar awardees, 1990

## Biological Sciences

**Brahmachari, S. K.**, Molecular Biophysics Unit, Indian Institute of Science, Bangalore

He has made contributions to the study of functional interactions of DNA. His work has helped to elucidate the sequence dependence of the conformation of Z-DNA. He and his associates have shown that the action of certain restriction endonucleases is sensitive to local conformational alterations and the Z-conformation blocks the action of *Escherichia coli* DNA polymerase-1.

## Chemical Sciences

**Choudary, B. M.**, Indian Institute of Chemical Technology, Hyderabad

He has made contributions by preparing anchored intercalated catalysts showing high selectivity and activity. His contributions to homogeneous catalysis using transition metal complexes are truly noteworthy.

**Sathyamurthy, N.**, Department of Chemistry, Indian Institute of Technology, Kanpur

He has done theoretical work in molecular reaction dynamics, especially on exchange and dissociation reactions as well as on time-dependent quantum mechanical study of reactive scattering.

## Engineering Sciences

**Pal, S. K.**, Electronics and Communication Sciences Unit, Indian Statistical Institute, Calcutta

He has made contributions that comprise a balanced mixture of theory, algorithms and applications using an equally balanced mixture of classical and modern concepts in the field of pattern recognition. His work is particularly signifi-

cant in image processing problems where the pattern ambiguity is due to inherent vagueness rather than randomness. He has developed various new fuzzy set theoretical tools for the analysis and recognition of patterns which include a new definition of image entropy.

**Prathap, Gangan**, Structural Sciences Division, National Aeronautical Laboratory, Bangalore

He has made contributions to fundamental understanding of finite element formulations. He addressed himself to a problem confounding the community of researchers and practitioners in computational mechanics, namely, obtaining entirely robust formulations. He has resolved the problem by evolving the concept of field consistency and field consistent elements. He has validated the concept by application to a range of structural problems.

## Mathematical Sciences

**Balasubramanian, R.**, Institute of Mathematical Sciences, Madras

He is famous for his contributions to analytic number theory. He is particularly well known for a substantial improvement of a long standing result of E. C. Titchmarsh and his contributions in settling Waring's problem for fourth powers.

**Dani, S. G.**, School of Mathematics, Tata Institute of Fundamental Research, Bombay

He has made contributions in the field of ergodic theory in general and properties of orbits of Lie group actions on homogeneous spaces in particular. The impact of his work in the fields of dynamical systems, number theory and topology is noteworthy. He and his collaborators have made important pro-

gress in the problem of imbedding an infinitely divisible probability distribution on a group in a continuous one parameter convolution semigroup.

## Medical Sciences

**Bhan, M. K.**, Department of Paediatrics, All India Institute of Medical Sciences, New Delhi

He has made contributions to aetiology, patho-physiology and treatment of persistent intestinal injury in children. His work identified the aggregative *Escherichia coli* as a major causative organism of diarrhoeal disease in India. He has developed starch based oral rehydration solutions for control of diarrhoea.

## Physical Sciences

**Baskaran, G.**, Institute of Mathematical Sciences, Madras

He has made contributions to the development of the resonating valence bond (RVB) theory of high temperature superconductivity in strongly correlated electron systems. His reformulation of RVB as a local gauge theory has opened new directions in this field. Of his other wide ranging contributions to condensed matter physics, the most notable are his works on fractional quantum Hall effect and the optimization problem.

**Sood, A. K.**, Department of Physics, Indian Institute of Science, Bangalore

He has, through his experiments on the colloidal aqueous suspension of charged polystyrene balls with tunable interaction, obtained results on the types of short and intermediate range order possible in condensed matter, including the glassy state. His other important contribution is the study of confined and interface optical phonons in semiconductor superlattices.

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### *Biological Sciences*

**Pandey, V. N.**, Biochemistry Division, Bhabha Atomic Research Centre, Bombay

Pandey has demonstrated the presence of a DNA recombinase enzyme complex associated with the thymic nuclear matrix of young rats. The complex specifically occurs in pre-lymphocytes and is presumably involved in the rearrangement and recombination of genes for the generation of immunodiversity in vertebrates.

**Saidapur, S. K.**, Department of Zoology, Karnatak University, Dharwad

He has contributed to comparative endocrinology of amphibians. He has elucidated the diverse patterns of reproductive processes and their control mechanisms in tropical anurans.

### *Chemical Sciences*

**Bagchi, B.**, Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore

He has made contributions in statistical mechanics, especially in the area of relaxation in solvation dynamics. Some of his theoretical predictions have been experimentally established.

**Yadav, J. S.**, Division of Organic Chemistry, Indian Institute of Chemical Technology, Hyderabad

He has developed several new methodologies useful in organic syntheses, especially for allylic and acetylenic alcohols and for spiroacetals. He has also shown insight and skill in executing synthesis of complex natural products.

### *Earth, Atmospheric, Ocean and Planetary Sciences*

**Sri Niwas**, Department of Geophysics, Kurukshetra University, Kurukshetra

He has made contributions in the field of forward and inverse solutions of geophysical problems, particularly for elect-

rical exploration of groundwater in alluvial terrains.

**Sengupta Sudipta**, Department of Geological Sciences, Jadavpur University, Calcutta

Sengupta has made contributions in interpreting deformation of boudinaged layers as well as pebbles in conglomerates by application of theoretical and experimental modelling and field testing.

### *Engineering Sciences*

**Joshi, J. B.**, Department of Chemical Technology, University of Bombay, Bombay

Joshi has innovatively combined incisive theoretical analysis with outstanding experimental work for the development of unified design procedures for multiphase reactors. Some of the procedures have been validated for large scale operations. A unique blend of theory, modelling and intuition has resulted in more efficient designs of bubble columns and mechanically agitated two and three phase reactors.

### *Mathematical Sciences*

**Mehta, V. B.**, School of Mathematics, Tata Institute of Fundamental Research, Bombay

He has made contributions to algebraic geometry, especially in problems related to homogeneous spaces of algebraic groups and the theory of vector bundles. The notion of Frobenius split varieties introduced by him and Ramanathan has led to rapid developments in the study of Schubert varieties.

**Ramanathan, A.**, School of Mathematics, Tata Institute of Fundamental Research, Bombay

He has made contributions to algebraic geometry. His joint work with Mehta, where the notion of Frobenius split varieties was introduced, has led to the solution of a host of problems on Schubert varieties and related topics. He

has also made important contribution to the study of stable principle bundles and related areas.

### *Medical Sciences*

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

She has made outstanding contributions in the area of human developmental neurobiology. Her work is responsible for a description of the chronology of proliferation, migration, synaptogenesis and organisation of neurons as well as of the neurotransmitter profiles of GABA and substance P in the lateral geniculate body in the visual pathway.

### *Physical Sciences*

**Dhar, D.**, Theoretical Physics Group, Tata Institute of Fundamental Research, Bombay

He has made contributions to theoretical understanding of statistical mechanics and kinetics on random lattices. His highly original researches have led to several insightful and exact results on fractals, directed lattice-animals, directed percolation, and on self-organized criticality.

**Mathur, D.**, Tata Institute of Fundamental Research, Bombay

He has made experimental studies of low energy electronic and ionic collisions which explore the transformation of multi-particle collidants from one quantal state to another. For this purpose, Mathur has developed a state-of-the-art energy spectrometric technique and various other related instrumentation in his laboratory. He has recently discovered a new class of isolated metastable multiply charged molecular ions which dissociate much less rapidly than would be expected from the conventional perturbative single-particle theories of atomic collisions.