

BARC NEWS LETTER

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No. 180, January 1999

FROM THE DIRECTOR...

Dear colleagues,



Greetings for the New Year. May the New Year mark a significant jump in our technological capability. I am expressing this wish on the basis of several new initiatives that are currently on. Last year was, no doubt, a year every one, both within and outside, will remember as perhaps the most significant year in the history of achievements of

BARC. This has created a new benchmark for us. It would be a challenge for all of us to maintain BARC on the ascend in the backdrop of last year's achievements.

The other day, I met a foreign scientist from Alps region. He is an enthusiastic mountaineer himself. He described to me how he managed to reach the site of crash of the aircraft accident in which Dr Bhabha died. He described the things he saw there very vividly. He also managed to bring a few pieces of

wreckage, which are still in his possession. He has agreed to share a part of them with us. I hope that one day we would have these historic relics with us in our possession. It was a great feeling to talk to a person who has been to the place where Dr.Bhabha is lying in peace.

I thought it fit to recall this in the context of our rejoicing the achievements of last year. We must remember that we are able to achieve heights of success because of the foundation laid by Dr Bhabha and several other pioneers of BARC. Let us continue our mission in a spirit of togetherness and in a manner that brings joy all around.

In the end, let me wish all of you and your families all happiness and fulfilment of individual expectations in the new year.

(Anil Kakodkar)



D. N. Pahuja
Radiation Medicine Centre

'Cultivate Health Instead of Treating Disease.' - John Ruskin

It is true that increased awareness in the health care systems, has raised the average life span expectancy of an individual, but it has also led to the rise in the incidence of quite a few chronic diseases, viz. Osteoporosis, Hypertension, Hyperlipidemia, Atherosclerosis, Colon Cancer, etc. This has become a major public health problem siphoning away more than \$15-20 billion every year, in USA on health care of osteoporosis alone. The situation in India is much more alarming, because of the lack of proper awareness in this regard, not only in the general public but also in the professionals. But, there seems to be some light at the end of this dark tunnel of debilitating diseases, consequent to the casting off the shrouding mystery surrounding the beneficial effects of increased calcium - nutrition. There has been slow but certain understanding about the hegemonic order enjoyed by calcium (Ca^{2+}) because of its involvement in the various metabolic functions in our *in vivo* system. It is, however, to be emphasized at the outset that such restriction of scope is not meant to deny the importance of any other element in the health care system.

Calcium is the most abundant element in our body, being located in three distinct areas, at the top of which is circulating level of Ca^{2+} - the most precisely controlled biological constant, which ensures normal function of brain, heart and other vital organs, at a level corresponding to 1:10,000 of that in the bone. Though 99% of the total calcium in our *in vivo* system is found in the bone, the function of calcium is by no means restricted to the supportive and locomotive function. Another important area of Ca^{2+} is the intracellular free Ca^{2+} , at a level of $\sim 1/10,000$ of the serum Ca^{2+} - concentration. Such a vast extra/intracellular calcium - concen-

tration - gradient is vital for all cellular functions such as mitosis, proliferation, differentiation, secretion, excitation, movement, phagocytosis, etc. However, this concentration gradient in the bone, blood and intracellular compartment could get blunted due to the rise in the intracellular free Ca^{2+} , of reduced Ca^{2+} - nutrition. Similar blunting of Ca^{2+} is also noted in other diseases viz. Ca^{2+} - concentration in smooth muscle cells, rises, in hypertension, in myocytes, in progressive muscle dystrophy, in myocardial and neuronal cells, in anoxia and in neoplastic cells. The loss of this Ca^{2+} - concentration - gradient, is also seen to be associated with the most of the conditions of cellular hypo-function, such as in aging process and in many chronic diseases.

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Recently, we have demonstrated that calcium plays an important role in maintaining the hepatic antioxidant defense system by protecting the second line of antioxidant defense, comprising GSH, alpha-tocopherol and protein-thiols. Our studies have further showed that, even raised lipid peroxidation in the hypocalcemic animals due to vitamin D - deficiency, could be reverted to normal by extra calcium supplementation, thus protecting the cells against peroxidative - membrane damage. Reduced levels of these potent anti-oxidants, besides increased lipid peroxidation due to accumulated short fall in the intake of dietary calcium over the years, could be the major factors, responsible in the development of the various disease processes. This is further supported by the large body of evidence from both clinical and epidemiological observations linking the most plausible inter relationship in between reduced dietary intake of Ca^{2+} and the development of chronic diseases. This is

more pertinent in our Indian population which hardly gets 0.3 - 0.5g of calcium per day from their diet compared to the minimum requirement of 1.0 - 2.0g per day, depending upon the age and the physiological status of the subject. Hence, supplementation of our Indian diet with a suitable calcium salt becomes mandatory. However, the proper information concerning the optimal utilization, i.e. bio-availability of the particular calcium formulation in our *in vivo* system, is lacking. Besides, the knowledge concerning the risk factors such as an association of extra calcium supplementation with hypercalcemia and/or soft tissue calcification and development of any other health problem, is must for the physician and patient.

So let us be forewarned to become fore armed, because preventing an onset of the crippling diseases is better than treating them later.



IN-SERVICE INSPECTION OF BWR CORE SHROUD AT TAPS

P. G. Kulkarni
Atomic Fuels Division

The core shroud of Boiling Water Reactors (BWRs) at Tarapur Atomic Power Station (TAPS) is 25 mm thick cylindrical vessel made of AISI 304 austenitic stainless steel. The main function of core shroud is to separate upward coolant flow from the downward feed water flow. Apart from this, the core shroud also provides structural support to the core and provides lateral support for fuel bundles to maintain control rod insertion geometry. During periodic in-service inspection of reactor core internals carried out in BWRs abroad, severe cracking was observed in some core shrouds. The cracks were confined to the weld heat affected zone. The cracking was attributed to intergranular stress corrosion cracking (IGSCC). The contributing factors for IGSCC are tensile stress, sensitized microstructure and corrosive environment. Welding leaves

large amount of residual stresses and creates sensitized microstructure in the heat affected zone whereas radiolysis of water provides oxygenated corrosive environment. In order to ensure the integrity of the core shroud at TAPS, it was decided to carry out in-service inspection (ISI). The core shroud at TAPS has 9 circumferential welds (Fig.1) numbered from H1 to H10 (there are no H2 and H7 numbered welds). Weld No. H1 is above the top grid plate, weld No. H3 is lug weld (12 lugs), weld No. H4A & H4B are between the top and the bottom grid plate and weld nos. H5 to H10 are below the bottom grid plate. Welds H1, H3, H4A and H4B are accessible for inspection from inside of the core shroud. The first in-service inspection was carried on Unit#2 in the year 1995. The inspection comprised of visual examination of HAZ and was limited to few locations

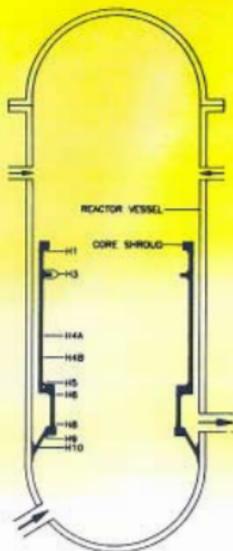


Fig. 1 : Core Shroud Welds

Subsequently, in the following years, improvements were made in the manipulator systems and the inspection techniques.

During the recent campaign (August - September 1998), these four welds were inspected by visual and ultrasonic examination. The purpose of visual examination was to detect presence of cracks in the weld HAZ which can be subsequently sized by ultrasonic examination. Since no visual examination was possible from outside surface, the ultrasonic examination was also useful for detecting any cracks originating from OD. The examination was divided into four states viz. (i) Precleaning visual examination, (ii) Cleaning of the core shroud surface (top & bottom HAZ), (iii) Post cleaning visual examination, and (iv) Ultrasonic examination.

During the earlier ISI campaigns, ultrasonic examination was limited to a few spot locations on H4A and H4B welds. Although these examinations ensured the absence of any long crack, the coverage achieved was limited. In order to increase the

extent of scanning a CART (Carriage for Advancing and Retracting Transducer) assembly was designed and fabricated. The purpose of CART assembly is to ensure proper contact between the shroud wall and the probe holder for getting the radial direction of the beam and to maintain constant water path between the probe and the shroud wall.

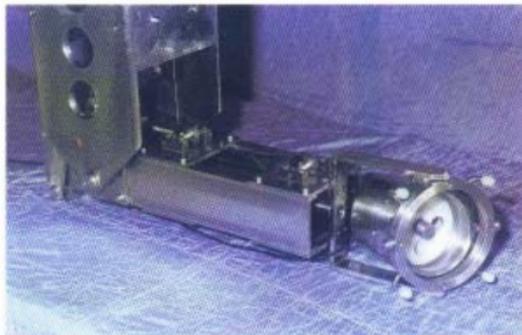
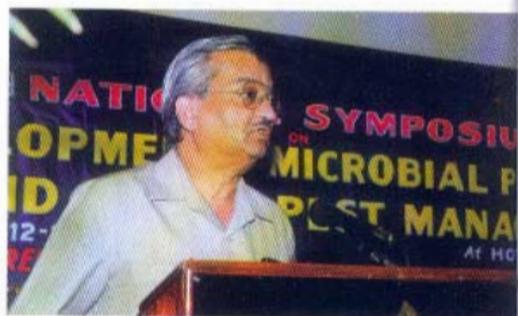


Fig. 2: CART Assembly for In-Service Inspection of TAPS Core Shroud

The CART assembly (Fig.2) consists of a probe holder which houses three probes (two angle beams generating 45° shear wave in the core shroud and one normal beam), gimbal assembly and the mechanism for advancing and retracting the gimbal assembly. The probe holder is fitted inside the gimbal assembly which has four pins. These four pins are kept in contact with the shroud wall during scanning. The gimbal assembly is moved forward and backward inside a rectangular channel with the help of a sliding mechanism on trolley wheels through pulleys and wire rope. The channel was hinged to a housing which was inserted in the reactor. The CART assembly was connected to GOM (Grapple Operated Manipulator) which in turn was connected to the Grapple. To begin with, the CART assembly was lowered inside the reactor cavity through one of the cells in the vertical position. After it reached the desired location, the assembly was swung to horizontal position with the help of pneumatic cylinder. At this position, all the four gimbal pins are in contact with the shroud wall. The assembly then rotated with

the help of grapple. During rotation, constant pressure was maintained on the shroud surface through the four gimbal pins using a counterweight mechanism. This ensured that the ultrasonic beam enters the shroud radially and a constant water path is maintained during scanning. After scanning for about 30° - 40° approximately by inserting through a fuel cell position, the CART mechanism is taken out and put into another cell for more coverage.

The design and fabrication of CART assembly was the outcome of the joint effort of QA group, NPC and AFD, BARC. The CART assembly was used successfully on H-4A weld during recently carried out ISI of Unit 2 at TAPS. Both top and bottom HAZ were scanned using CART and about 70% coverage was achieved. A few indications were recorded. No indication had an amplitude more than that from reference flaw. However, all these indications were point indications. No linear indication exceeding the reference was observed. This ISI campaign did not reveal any significant crack-like indications in the heat affected zones of the four welds examined. The campaign was carried out by trained personnel from NPC (QA group), AFD and TAPS.



Dr Anil Kakodkar, Director, BARC, addressing the National Symposium on Development of Microbial Pesticides and Insect Pest Management

and visions for meeting new challenges arising out of globalization and liberalization processes. The Symposium was inaugurated by Prof. N. K. Ganguly, Director General, Indian Council of Medical Research, New Delhi. In his keynote address he stressed the need for research in the direction of ecofriendly integrated vector management of insect pests. Several speakers shared their efforts in various fields of biocontrol with fellow delegates. In his concluding address, Dr Anil Kakodkar, Director, BARC emphasized the need based research in this field.

NATIONAL SYMPOSIUM ON DEVELOPMENT OF MICROBIAL PESTICIDES AND INSECT PEST MANAGEMENT

A National Symposium on Development of Microbial Pesticides and Insect Pest Management was organized jointly by Bhabha Atomic Research Centre and Hindustan Antibiotics Limited, Pune between November 12-13, 1998 at Pune. This Symposium served as an excellent platform for scientists, administrators and policy makers from national laboratories, university departments, industries and Government to interact, deliberate and project their views

SEMINAR ON CHEMISTRY IN ATOMIC ENERGY PROGRAMME : A SAGA OF EXCELLENCE AND RELEVANCE

A seminar on "Chemistry in Atomic Energy Programme : A saga of excellence and relevance" was held at Central Complex Auditorium BARC on 27th November 1998 as a part of activities to mark Golden Jubilee of Atomic Energy Programme in India. The seminar was inaugurated by Dr Anil Kakodkar, Director, BARC. In his inaugural address Dr Kakodkar recalled the vital role

chemistry has played in the implementation of atomic energy programmes in India. On this occasion Director, BARC released a book entitled '*Chemistry in Atomic Energy Programmes: An account of 50 years: 1948-1997 - A Saga of Excellence and Relevance*' written by Dr K. S. Venkateswarlu and Dr A.M. George. He also released a list of technical publications of Chemistry Group for the past 25 years. In his address Director, BARC emphasised the dual role of scientists both as generators and users of the knowledge and expected to strengthen synergy between the two roles as ideal for national development. Basic research is the pursuit of excellence and applied research signifies its relevance. Relevance implies ultimate satisfaction of the end user, he said.

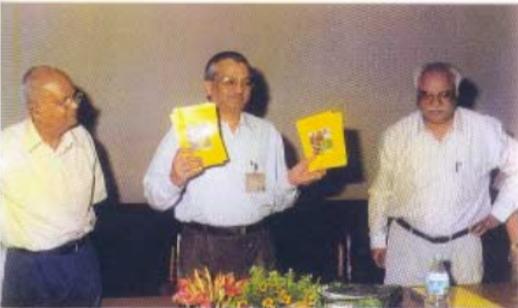
Dr C. Manohar, Head, Chemistry Division welcomed the delegates which consisted of several present, past and retired colleagues who contributed to the Chemistry Programme of DAE. Dr J.P. Mittal, Director, Chemistry Group in his remarks traced the history, growth, evolution and diversification of the chemistry discipline in BARC & DAE during the past 50 years. Indicating several parameters he demonstrated the excellence of Chemistry in BARC at international level and the relevance in the indigenous development of nuclear fuel cycle.

Dr K. S. Venkateswarlu, former Head, Water Chemistry Division, BARC, and one of the authors of the book explained the genesis of the book and dwelled into the past to give reminiscences of the early years. Dr P. K. Padmanabhan, Convener of the seminar proposed vote of thanks.

As a part of scientific deliberations Dr A. J. Singh: (Role of Chemistry in materials development); Dr P. K. Padmanabhan (Analytical Chemistry: A Kaleidoscopic overview); Dr B. Venkataramani: (Basic research on oxides); Dr P. K. Mathur (Power reactor water chemistry) Dr S. Chattopadhyay : (Bio-Organic Chemistry in BARC: Its evolution and impact); Dr T. Mukherjee : (Radiation and Photochemistry); Dr J. V. Yakhmi (Novel materials: Design & development); delivered lectures to highlight contributions of various divisions in chemistry group. The seminar also provided a meeting ground for present and past colleagues to discuss with the peers in their respective areas. Dr J.P. Mittal, Director, Chemistry Group gave concluding remarks and projected the role of chemistry in DAE programmes in the future years to come.

ISOTOPE TECHNIQUES IN WATER RESOURCES INVESTIGATION IN THE ASIA PACIFIC REGION

An IAEA Advisory group meeting on Integration of Isotope techniques in water resources investigation in the Asia Pacific region was held in November 2-5, 1998 at Centre for Water Resources Development and Management (CWRDM), Kozhikode. The meeting was organised in collaboration with BARC. Participants from Malaysia, Myanmar, India, South Korea, Sri Lanka and Thailand attended the meeting. Besides CWRDM and BARC, other institutes in India which were represented included NGRI, Hyderabad, NIH Roorkee, CGWB (Nagpur, Faridabad, Calcutta and Trivandrum) and University of Roorkee. Dr Pradeep Aggarwal, IAEA was the Scientific Secretary of the meeting. The meeting was inaugurated by Dr P. Basak,



Dr Anil Kakodkar, Director, BARC, releasing the book "Chemistry in Atomic Energy Programmes: An account of 50 years: 1948-1997 - A Saga of Excellence and Relevance" with Dr K. S. Venkateswarlu to his right and Dr J.P. Mittal to his left.

Director, CWRDM and Prof. B. B. S. Singhal and Dr S. P. Sinha Ray were elected Chairpersons of the meeting.

The meeting was divided into three sessions. Session I was on status of applications of isotopes in hydrology. This included a general review of isotopes in water resources development and management and the role of IAEA in such activities. Isotope techniques in water resources management practices in India, particularly in arid and semi arid zones, groundwater salinity investigations, surface water - groundwater interaction studies, groundwater recharge and also in lake sedimentation studies were specifically discussed in the first session.

In session II water resources issues in the region of Asia - Pacific were discussed. Presentations were made by representatives from India, Malaysia, Myanmar, S. Korea, Sri Lanka and Thailand on specific topics of interest to isotope geochemistry.

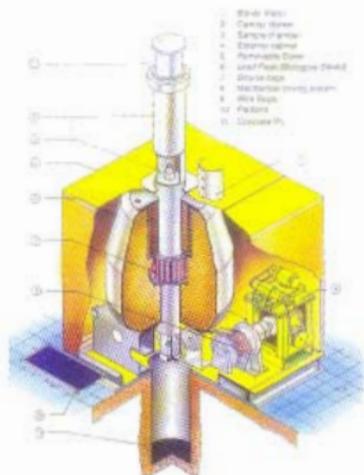
Session III discussed strategies for wider application of isotopes in hydrology. The issues discussed were

- Identification of specific water resource issues amenable to isotope applications.
- Constraints in isotope applications and ways to overcome them.
- Capacity building through awareness programmes and inclusion of isotope hydrology in University Courses in Hydrogeology.

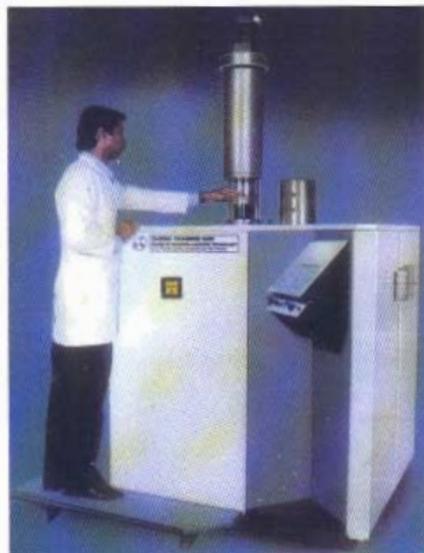
Among the recommendations of the meeting to overcome constraints and capacity /capability building were : The formation of a national coordination committees with representatives from institutes doing isotope work and water resource professionals and training both at regional and national level using national/ regional experts.

COMMISSIONING OF 'GAMMA CHAMBER 5000' FOR IRRADIATION TESTING OF BARCIS IN-CHANNEL COMPONENTS

Under IX plan project Development of Tools & Techniques (Power-6), Reactor Control Division has taken up indigenous



Gamma Chamber 5000 - Sectional View



Gamma Chamber 5000

development of miniature underwater radiation resistant CCTV Cameras for use in BARCIS. The electronic, optical and other components of such cameras are required to be tested for gamma radiation resistance of 10^8 Rads of 10^6 Rads/h (approx.) A dedicated GAMMA Chamber 5000 has been commissioned at HIRUP, Isotope Division, BARC for this purpose. The chamber has a volume of 5000 CC and uses cobalt source of 13,000 Curies. The maximum field in the central region of the chamber is estimated to be 0.9×10^6 Rads/h. The chamber shall also be used for irradiation testing of other in-channel components of BARCIS like servo-inclinometers & ultrasonic transducers. This facility was inaugurated by Dr Anil Kakodkar, Director, BARC on December 17, 1998. For further details Contact : Mr Manjit Singh, Head, Control Mechanisms & ISI Section, Reactor Control Division, BARC or Dr A.B. Majali, Head, Radiation Processing Section, Isotope Division, BARC.



Dr Anil Kakodkar, Director, BARC lights a lamp to formally inaugurate ANACON-98. To his right is Prof. V. S. Ramamurthy, Secretary, Dept. Of Science & Technology, Government of India, with Dr P. K. Padmanabhan of Analytical Chemistry Division, BARC (Chairman, ANACON, Technical Committee) in the background

ANACON-98

Dr Anil Kakodkar, Director, BARC has called upon the scientific community to work on projects of national importance. He was formally inaugurating ANACON-98 Conference and Exhibition on analytical and scientific instrumentation organised by Indian Analytical Instruments Association at Nehru Centre in Mumbai on December 16, 1998. Dr Kakodkar said while carrying out important scientific tasks, synergy between various departments was important. "It is through technological strength we can make technological denials meaningless" he asserted. Technological innovations are the only way to win at the market place and get over technological denials. The country is moving from a protected commercial environment to a liberalised environment which has thrown open challenges and also opportunities. Dr P.K. Padmanabhan, Chairman, Technical Committee apprised that

more than 150 original contributions have been published by ANACON this year which clearly reflects the synergy between basic and applied research for technological development.

ELECTRICAL SCADA SYSTEM HANDLED OVER TO NPC

An Electrical Supervisory Control and Data Acquisition System (SCADA) developed at Reactor Control Division, BARC was handed over to Dr Y.S.R. Prasad, Chairman and Managing Director of Nuclear Power Corporation (NPC) by Mr V. H. Ron, Officiating Chairman and Managing Director of the Electronics Corporation of India,



Dr Y. S. R. Prasad, CMD, NPC holds up the key to the SCADA system after receiving it from Mr V. H. Ron, Officiating CMD, ECIL as Mr A. K. Gupta, Director, ESG, BARC looks on.



Overview of SCADA hardware showing (from left) panels for RAPP-4 Turbine Building, RAPP-3 Turbine Building, RAPP-3 Control Equipment Room, RAPP-4 Control Equipment Room and the RAPP-3,4 Switchyard. In the foreground are the three Operator Display station computers and two server computers.

Ltd.(ECIL) on October 15, 1998 in the presence of Mr A. K. Gupta, Director, Engineering Services Group, BARC.

The system has been developed to provide operators in the Main Control Rooms and in the Switchyard Control Room of RAPP-3 and RAPP-4 nuclear power plants, the capability to monitor and control the status of various electrical equipments. The system has been developed at Reactor Control Division, BARC and engineered and fabricated at

ECIL. ECIL and BARC had jointly secured the order for the system in January 1996 against a public tender (see *BARC Newsletter* No. 145, February, 1996, pp. 11-12).

Dr Prasad, speaking on the occasion, remarked that in spite of the international control regime, the Electrical SCADA system had been developed and manufactured in a very short time. He suggested that the possibility of entering the international market with such systems should be explored.

Mr Ron, expressed happiness at handing over the first indigenously developed SCADA system and said that the system is on par with the latest systems available in the international market.

The system has since been despatched to Rajasthan Atomic Power Plant (RAPP), Kota and is under installation.

The SCADA system (loc.cit.) is used for monitoring, event recording and control of the electrical system network. It displays values of various measured and computed electrical parameters, and, status indication of various equipments. It provides sequence of events reporting, and, alarms for various electrical abnormalities, and, indications for safe operation and maintenance of electrical equipment. It also permits control of Open/Close operation of circuit breakers, isolators, etc.

The Electrical SCADA computer system is based on an open architecture with a three layer plant wide network and can be adapted in terms of size and functionality to meet the needs of any industrial plant. Thus, the user can define expansion in number of input and output signals and can also define functionality including in terms of screen display, report generation, field output, etc. The system offers an exceptionally user friendly man machine interface with several versatile display schemes.

The hardware has been built using VME bus based boards and the software has been developed on Windows NT platform

according to established international standards. The present design caters to a total of 2600 digital inputs, 400 analog inputs and 256 digital outputs.

BARC SCIENTISTS HONOURED

On the Republic Day 1999, Dr R. Chidambaram, Chairman, Atomic Energy Commission was honoured with Padma Vibhushan, the second highest national award, by Government of India. Dr Anil Kakodkar, Director, BARC was honoured with Padma Bhushan. Mr M.S. Ramakumar, Director, Automation & Manufacturing Group and Dr S.K. Sikka, Director, Solid State & Spectroscopy Group were honoured with Padma Shri.

The Indian Analytical Instruments Association bestowed the *Life Time Achievement Award* in Nuclear Science on Dr Anil Kakodkar, Director, BARC on 16th December, 1998 at ANACON-98, Mumbai. Last year the award was conferred to Dr R. Chidambaram, Chairman, AEC. This award is normally given to outstanding professionals who have made significant contributions in changing the face of scientific research and converted their research into national importance.

The National Foundation of Indian Engineers (NAFEN) conferred the 1998 NAFEN's Excellence Corporate Award *Best R&D Man of the Year 1998* on Dr Anil Kakodkar, Director, BARC. The award was presented to Dr Kakodkar on January 15, 1999 during the inauguration of the XII International Congress & Exhibition on Research & Development at New Delhi.

Mr M. S. Hanra, of Desalination Division of Bhabha Atomic Research Centre has been awarded *NOCIL Award for Excellence in Design/Development of Process Plant and Equipment* by Indian Institute of Chemical Engineers alongwith Prof S. S. Narayanan and P. B. R. Nair of IIT, Chennai. Mr Hanra received the Award for his valuable

contribution in the field of desalination and membrane based separation technology (MBST). The award consisting of a citation and cash was presented to him during the 51st Annual inaugural session and Chemical Engineering Congress (CHEMCON-98) held at Andhra University, Visakhapatnam on 16th December, 1998.

Dr S. R. Padwal-Desai, Head, Food Technology Division, has been nominated as a *Fellow of the National Academy of Agricultural Sciences* for his significant contribution in the field of Food Science and Technology.

The paper 'Nondestructive characterisation of MOX fuel rods using gamma autoradiography (GAR)' by Jose P. Panakkal, D. Mukherjee, V. Manoharan and H. S. Kamath, of Advanced Fuel Fabrication Facility, Tarapur published in the *Journal of Nondestructive Evaluation* in 1997 has been selected by the Indian Society for Nondestructive Testing (ISNT) for the *National NDT Award 1998 for the best paper on R&D*. The award was presented during the inaugural function of the National Seminar NDE-98 held at Thiruvananthapuram during December 10-12, 1998 and a presentation was also made by Dr Jose P. Panakkal Superintendent (Quality Control), AFFF during the seminar.

Dr K. Bhanumurthy from Materials Science Division was awarded the *Young Research Award* in recognition of his paper entitled "Analysis of reaction products formed during diffusion bonding by electron probe microanalysis", co-authored by Dr R.V. Patil and Dr G.B. Kale, presented at IUMRS-ICA - 98, The 5th International Conference in Asia, held at IISc Bangalore was organised by Materials Research Society of India (MRSI) and The International Union of Materials Research Societies (IUMRS) during October 13-16, 1998. Dr G. P. Tiwari from Materials Science Division also awarded for his paper entitled "A study of reactivity and sinterability of uranium dioxide powder through surface adsorption" co-authored by Dr A. G. C. Nair from Radiochemistry Division at the same conference. These awards carry a citation certificate.

Contributions from scientists of Materials Science Division received acclaim in the 52nd Annual Technical Meeting of the Indian Institute of Metals, held at Bangalore during 14th - 17th November, 1998. In the metallographic contest, Dr M. Sundararaman, Mr J.B. Singh, Mrs P. Agashe and Dr P. Mukhopadhyay were awarded the *first prize* under the category, "Transmission Electron Microscopy" and Dr G. K. Dey was awarded the *second prize* in the same category. Dr K. Bhanumurthy's paper on "Characterisation of solid state bonde Zr-2.5% Nb/403 steel diffusion couples", co-authored by Dr D. Srivatsava, Mr P. S. Gawde, Dr R. V. Patil and Dr G. B. Kale was chosen for the *best poster award* under the category "Metal Sciences". Each of these awards carry a cash prize and a citation certificate.

Dr Prasun Kumar Mukherjee from Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Centre, has been conferred with the prestigious *Pran Vohra Award for 1998-99* by Indian Science Congress Association in recognition of his outstanding contributions in biological control of plant diseases. Pran Vohra Award, which carries a certificate, a citation, and Rs 10,000/- cash award, is intended to honour talented young scientists who have made significant research in any branch of agricultural sciences. Dr Mukherjee delivered this year's Pran Vohra Memorial Award Lecture (Biological control of *Sclerotium rolfsii*, *Rhizoctonia solani* and *Botrytis cinerea* with *Trichoderma* spp.) on January 5, 1999 at the 86th Indian Science Congress at Chennai. Dr Mukherjee joined BARC in 1993 on completion of "Dr K. S. Krishnan Fellowship".

The 4th International Food Convention (IFCON-98) was held in CFTRI, Mysore between 23-27 November, 1998. Several BARC scientists from Food Technology, and Nuclear Agriculture & Biotechnology

Division attended the conference and presented their recent work. Two poster papers from Food Technology Division were selected for the *best paper awards*. Dr (Mrs) Anu Kamat, Mr Rahul Warke and Dr M.V. Kamat received *second prize* for their presentation entitled "Shelf-life enhancement of cakes by combination of sorbic acid and gamma radiation", and Dr S.R. Padwal-Desai, Dr V.N. Pawar and Dr A.G. Behere were awarded *third prize* for their presentation entitled "Production of technological preparation of pectic enzymes of *Aspergillus flavus*"

Dr Vijay Kumar Jain of Solid State and Spectroscopy Group has received an award from Shri Ramamurty Memorial Trust, Bareilly, U.P. The award is given each year to persons of eminence in recognition of their commendable and notable achievements in the field of literature, science, medicine, sports, etc. A few notable persons in receipt of this award in the past are Dr B.K. Goyal, famous heart specialist and Mr Sundarlal Bahuguna, famous environmentalist. The award which is instituted in the memory of freedom fighter late Shri Ramamurty is called *Shri Ramamurty Pratibha Alankaran* and comprises a silver plaque and a citation.

Dr S. A. Ahmad of Spectroscopy Division, BARC, has been elected *President of the Indian Society of Atomic and Molecular Physics*, (ISAMP), for two years (1999-2000), during the ISAMP's General Body Meeting held at Udaipur on December 31, 1998 on the occasion of XII National Conference on Atomic and Molecular Physics. ISAMP was established in 1973.

Dr S. G. Nakhate of Spectroscopy Division was awarded the *Best Thesis Award* at the National Laser Symposium held at IIT, Kanpur from December 14 to 16, 1998. There were seven candidates from different national institutions and universities. The award consists of Rs 3000/- cash and a certificate.