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Field of Expertise Environmental Biotechnology and IPR

Date of Birth May 24, 1952

Profile

With a strong focus on translational research, I have been able to develop around **19 technologies**, which are at different stages of development i.e. a couple commercialized and a few have been demonstrated at field scale. For effective dissemination and further commercialization, it is pertinent that generated knowledge be embodied in some form of IPRs, preferably in the form of patents. So, the emphasis was given for aggressive patenting (**filed patents - 120; granted patents -97**). **In order to** understand the problems of the society and industry in depth, I have interacted with different industrial houses sector wise. Scientific collaboration, managerial capabilities, interpersonal skills, and networking are my core strength.

I have served as CMD, National Research Development Corporation (NRDC), New Delhi on an additional charge August-September 2012 and April-September 2013 and streamlined quite a few lag issues. I am also on the Board of Directors of Biotech Consortium of India Limited (BCIL), New Delhi. She is recipient of **Arya Bhatt Puruskar 2013**, organized by Indian Swadeshi Vigyan Andolan (Vigyan Bharti, Delhi), **CSIR Technology Innovation Award 2012** and **Merck Millipore India Innovation award 2012**.

Educational Qualification

- Ph.D. (1984) Ph.D. Medical Microbiology from Vallabhbhai Patel Chest Institute, Delhi University, Delhi.
- M.Sc. (1974) M.Sc. Microbiology from Haryana Agricultural University, Hissar, Haryana
- B.Sc. (1971) B.Sc. Life sciences from Jammu & Kashmir University, Srinagar

Major Achievements

- Commercialized BOD biosensor successfully to M/S Forbes Marshall Company. BOD Biosensor can estimate the BOD load in just one hour in comparison to conventional test of five days. **The product has entered the market. 2013**
- Commercialized **BODSEED technology** to Pune based firm in 1998.
- Completed Field scale demonstration of biological neutralization successfully at Coca Cola Plant. Sponsored by **Coca Cola India**. Certification of successful completion obtained. **Also obtained a no objection certificate to market the technology. Patents granted till date.**
- Demonstrated field-scale study for **“Biological treatment of pulp and paper industrial waste water” at Star Paper Mill, Saharanpur. 2013**
- Highest IPR generation in IGIB (**120 patents filed and 99 granted**). **Not a single patent filed has been abandoned till date.**
- **Knowledge management and dissemination** through conceptualizing five databases as open source.

Patents - **95**

Publications - **67**

Awards - **12**

Technologies Developed **19**

R&D Projects – **23**

Invited lectures -**57**

Research Presentations - **79**

Database Development - **5**

Industry Visits -**16**

Foreign visits -

Research guidance

Professional memberships

Employment Profile

- In-charge - Quality Control, Antigens 1976-1992
- Approved as Analytical Chemist by Drug Controller of India
- Additional charge – CMD, NRDC

Research Interest

- IPR and R&D Management in Biological Sciences
- Environmental Biotechnology
- Knowledge (Biological) Management
- White Biotechnology
- Environmental Bioinformatics

IPR Expertise

- Drafting patents
- Defending patents queries.
- Advanced Course on ‘Biotechnology and Intellectual Property’ from WIPO Distance learning, 2008.
- General Course on Intellectual Property from WIPO Distance learning, 2003.
- Participation in the event “Innovation: Advantage India” held on 4th October, 2007, FICCI, New Delhi.
- Participation in the “World IP Day Seminar on Harnessing IP for Nation Development” held on 26th April 2008 at FICCI, New Delhi.

Training

- On Management Of Research, Administrative Staff College Of India, Bella Vista: Hyderabad.
Sponsored: - Ministry of Environment and Forests, Government of India
- NIAS

Research Experience

- **White Biotechnology:** Bio-bleaching of wood pulp, decolorization of waste water, Biological reduction of AOX from waste waters, developing specific seeding material for BOD estimation and industrial enzymes such as laccase, xylanase, lignin peroxidase and Manganese peroxidase.
- **Environmental OMICS:** Modeling of bio-degradative enzymes, Protein-Ligand docking, DNA-pollutants interaction, Bacterial genetic based biosensors for pollutants detection.
- **Biosensor:** The conventional BOD test requires 5-7 days, and consequently it is not a suitable method for on-line process monitoring of waste waters. Thus, it is necessary to develop a biosensor that could circumvent the weaknesses of the conventional method. I have research experience in developing a BOD biosensor which can estimate the BOD of waste water in short time.
- **Knowledge management:** Conceptualizing and developing databases for easy and effective knowledge management and dissemination for biological information. So far, I conceptualized six databases, namely, Appobase (<http://appobase.igib.res.in/appobase/>), Extrem, CSD, BOD, Phanerochaete chrysosporium database and biosensors database.
- **IPR and R&D management:** Experience in analyzing the IPR aspects of biological R&D. Drafted ten patents and four copyrights so far.
- **Extremophiles:** Isolation and exploitation of extremophilic bacteria for industrial application.
- **Waste Water Treatment:** Sewage treatment, waste water treatment of pulp & paper, tannery, beverage industries.

Empanelled as Scientific Advisor under Rule 103 of the Patent Rules, 2003 by Drug controller of India 2010

On the Board of Directors, Biotech Consortium India Limited (BCIL), New Delhi

Participation in policy formulation and / or decision making

Consideration of BOD Biosensor technology developed by IGIB in a draft proposal regarding pollution abatement infrastructure for continuous online monitoring of air & water quality by Industry all over the country – recommended by Secretary, DSIR to Planning Commission

Business development and technology market

- Market Potential of Biotechnology based environmental solutions and R&D” and submitted to BDMG in November, 2005.
- Prepared report towards presentation on ‘Microbial System’ in the session on “Life Sciences’ or presentation in CSIR-Industry meet held on 7th October, 2005.
- Report submitted for Parliamentary Committee as desired by MoEF & DBT Document on “Technological Research in Applied Environmental Microbiology” at IGIB (CSIR), Mall Road, Delhi
- Prepared Flyers of technologies developed
- Aggressive liasioning helped in achieving lead for getting finances from DBT and Department of Commerce for up-scaling of the developed know-how in pulp and paper sector.
- **Following companies showed interest in developed technologies.**
 - a) Pepsico for TDS removal
 - b) Nicholas Canello for alkali neutralization
 - c) Research Centre of Gujarat State fertilizers and Chemicals Ltd for reducing COD
 - d) Tesla Liquid Engineering for Bioaugmentation
 - e) ILFS for alkali neutralization of textile waste waters
 - f) Green Circle Inc for R & D contract research
 - g) Radix Global for for patent licensing
 - h) KRP for bioremediation of pulp and paper waste waters
 - i) Shiva Moodley for marketing BOD Biosensor in South Africa and Australia
 - j) Himathsingka linens for alkai neutralization of textile waste water
 - k) Ocean International for exploring business venture related to water treatment

Participation in Conferences like Water Asia, FICCI and CII has resulted in industry sponsorship in order to disseminate the information on R & D endeavors being pursued in IGIB

Thereby, facilitating improvements/decision making for industry or government or other stakeholders

Nominations by Director General

- For the post of Vice-Chancellor, TERI University - 2008-2009
- For the post of Chairman, CPCB, December 2008
- **As Member** of Project Evaluation Committee of “Waste to wealth” programme organized by DSIR and visited VIT, Vellore to assess one project on bioremediation of tannery waste waters
- **As Member in UNDP organized** Inception Workshop for the Development of National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants (POPs), New Delhi, 6th May 2008
- **As Member** to attend 57th AGM of the National Research Development Corporation meeting on 1st December, 2011 at CSIR Head Quarters, New Delhi

Nominations by Director, IGIB

- TATA Innovation Fellowship March 2008
- National Woman Bio-scientist Award November 2008
- DSIR Best Invention Award May 2008
- Indo-South Korea Projects held on 12th December, 2008

Nominated by Chairman Recruitment & Assessment Board of CSIR (RAB) as Departmental Core Committee Member of Selection Committee in the area of Biological Sciences for meeting held at CLRI on 20th October, 2010

Participated in CSIR programme on Youth for Leadership in Science on 12th-13th April, 2005

Member in various in-house and other committees

- **Member** Collegium IGIB for Scientist F, Committee to evaluate the contributions/achievements of Scientists of IGIB: 2011
- **Member** BDMG – IGIB 2011
- **Chairman** - Allotment Committee – IGIB - 2010-11
- **Member** of Review Meeting on Technology Innovation Management & Entrepreneurship Information Service (TIME) organized by FICCI on 9th February, 2011
- **Distinguished Member** - Advisory Council for Water Asia 2000, 2005, 2007, 2008, 2009, 2010
- **Member**- First meeting of the National Standing Committee For Women Scientists held at 2011, Conference Hall, CSIR on 16.09.2010
- **Member**- Review Committee of 11th 5 year Plan Scheme “Studies on DNA typing of biological samples and generation of database on DNA markers” at National Institute of Criminology and Forensic Science, Ministry of Home affairs, Government of India (November 12, 2010)
- **Distinguished Member**- Advisory Council for Aquatech India 2011
- **Member** – Project Review Steering Group PRSG for the project “POLYSENSOR ” for evaluating the feasibility and functioning of Polysensor developed by IIT, Bombay
- **Member**- Students Affairs, BDMG – IGIB
- **Chairman** – Committee for Foundation Day celebrations for School Events
- **Evaluated** an Indo-US Joint Centre Programme on ‘Bioremediation and Phytoremediation of Chemopollutants’ for support by Indo-US Science and Technology Forum
- **Facilitated** advice to Joint Member Secretary-cum-Director, Environment Planning Unit Himachal Pradesh State Council for Science and Technology and Environment, Shimla on sample examination by different Governmental agencies for expansion plan of M/S Ranbaxy Laboratories in Paonta Sahib (Himachal Pradesh)
- **Participated in deliberations** in a Meeting regarding Environmental Friendly Toilet Project held at New Delhi on 28th April, 2005 organized by IIT Kanpur for Indian Railways.
- **Participated in deliberations** for existing technologies in pulp and paper sector in Conference on 7th international Conference on Pulp, Paper and Conversion Industry held on 3-5 December, 2005 at New Delhi
- **Participated** in “One Day Interactive Brain Storming Session –Preparation of Comprehensive Draft Scheme For Pulp and Paper Industry- on 9th June, 2006 at New Delhi organized by Central Pulp and Paper Research Institute.

- **Invited to participate** in ‘Second Brain-storming Session to evolve a Strategy on the use of Electronics and ICT in the area of Water Quality Analysis and Purification’ organized by Media Lab Asia, a constituent concern of Department of Electronics
- **Member**, Meeting on proposed model of National Biotechnology regulatory authority for involvement of States in the regulation of Biotechnology based research and development held at CS Office, Delhi Secretariat on 9th July, 2008
- **Member** in First Meeting of the National Standing committee for Women Scientists at CSIR Head Quarters on 16th September, 2010

Exhibitions/Workshops

- **Organized** A seminar-cum-workshop for commercialization of BODSEED to Industry 1998
- **Demonstrated** technologies developed at IGIB at Pragati Maidan at Trade Fair
- **Demonstrated Model of BOD BIOSENSOR** – table top model for “Ecology and Environment” pavilion in CSIR technofest 2010- Science and Innovation for transforming India in India International Trade Fair held at Pragati Maidan, New Delhi on 14-27 November, 2010