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**An Academic Administration Position with teaching and high quality  
Research activity in Interdisciplinary Biology**

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**MY UNIQUE SELLING PROPOSITION (USP)**

- Worked with the Research Group of Prof. Erwin Neher (Nobel Laureate, Medicine & Physiology, 1991) and published paper (FEBS Letters, 511, 28-32, 2002).
- Discovered Mechano-sensitive Ion Channels in growing pollen tube (Research Highlights in NATURE, **430**, 416).
- Published Patent # 31481 (The Patent Office Journal October 2010 page # 126) "Electrical Biosensor for Early Detection of Graft Compatibility in Plants" with International Classification G01N27/00.
- Involved in UGC, AICTE, NABL NAAC and NIRF documentations and inspections at Universities.
- Excellent knowledge about UGC Act, University Act, Statutes and Ordinances, prepared these document for Indian Private or Deemed Universities.

**Academic Performance Index (API) as per UGC PBAS**

S.N.	Category and Details	API*
1	<b>Category I:</b> Teaching, Learning and Evaluation Related Activities	2760.0
2	<b>Category II:</b> Co-curricular, Extension and Professional Development Related Activities	2515.0
3	<b>Category III:</b> Research and Publication and Academic Contributions	1846.5
	<b>Total</b>	<b>7121.5</b>

\* as on October 14, 2015

**QUALIFICATIONS**

**(a) Educational (Highest two degrees):**

**Birla Institute of Technology and Science**

Pilani, Rajasthan, India

September 1998

Ph.D. in Biotechnology

**Title of the thesis:** The biophysical mechanism(s) of electrical stimulation on *in vitro* growth and differentiation in *Populus deltoids* and *Nicotiana tabacum*.

**Indian Institute of Technology**

Kharagpur, W.B., India

January 1989

M.Tech. in Biotechnology and Engineering

**Title of Dissertation:** Bioproduction of diosgenin through *in vitro* culture of *Kallstroemia pubescens* (G. Don) Dandy

## (b) Elected Fellow or Member of the Academies/ Societies

- (a) Indian Society of Genetics and Plant Breeding (Fellow)
- (b) World Academy of Science, Engineering and Technology (Elected Member)
- (c) American Academy of Science and Technology (Fellow)
- (d) International Academy of Arts, Science & Technology (Fellow)
- (e) International Society for Research and Development (Fellow)
- (f) International Academy of Science, Engineering and Technology (Fellow)
- (g) National Academy of Sciences, India (Elected Member)
- (h) New York Academy of Sciences Elected (Member)
- (i) Sigma-Xi, USA (Elected Member)
- (j) The American Society of Research (Fellow)

## (c) Professional Training:

	<b>Place</b>	<b>Title of Training</b>	<b>Duration</b>
1	KG Medical College, Lucknow	Animal Cell Culture techniques for chromosomal preparation	Dec. 1986 to July 1987
2	National Chemical Laboratory, Pune	Plant Tissue Culture for micropropagation, somaclonal variation and protoplast technology for plant improvement	Feb. 1 to 14, 1988
3	National Botanical Research Institute, Lucknow	Plant Tissue Culture Techniques	May 1988 to Dec. 1988
4	Center for Cell and Tissue Culture, Kyoto University, Kyoto	Image analysis in Plant Tissue culture	June 3 to 23, 1998
5	Birla Institute of Technology & Science, Pilani	Indo-US workshop on Recombinant DNA and its application in drug discovery and Biotechnology	Feb. 22-27, 1999
6	Birla Institute of Technology & Science, Pilani	BRNS National workshop on Radiochemistry and application of radioisotopes	Oct. 15-22, 2000
7	The Nobel Foundation, Ardmore, OK and Oklahoma State University, Stillwater, OK	Bioinformatics Fundamentals	June 1-10, 2001

## WORK EXPERIENCE

### (a) Teaching Experience:

Oct. 1993 to Dec.2000	Lecturer/ Lecturer-Senior Scale at the Biological Science Group, Birla Institute of Technology & Science, Pilani, India (Core Group faculty at Center for Biotechnology- A multidisciplinary center)
July 2005- August 2009	Professor & Deputy Director (Off. Director), AMITY Institute of Biotechnology, Amity University Uttar Pradesh, Lucknow
August 2009- March 2011	Professor & Director, School of Biotechnology and SU-QNS Center for Excellence in Nanotechnology and Bio-inforamtics, Shobhit University, Meerut, India
April 2011-July 2011	Professor & Program Director-Biotechnology, Department of Biotechnology, MIET, Meerut.
August 2011- August 2012	Director, School of Biotechnology, IFTM University, Moradabad.
August 2012- August 2013	Dean and Sr. Professor, Faculty of Biological Engineering, Graphic Era University, Dehradun
August 2013- July 2016	Director and Sr. Professor, Institute of Bioscience & Technology (IBST), Shri Ramswaroop Memorial University, Barabanki.
July 2016-till date	Senior Professor & QNS Chair Professor in Nanobiotechnology, Department of Biotechnology, Sharda University, Greater Noida.
<b>Courses Taught during above assignments:</b>	Biochemical Engineering, Cell & Tissue Culture Technology, Nano-Biotechnology, Biomedical Instrumentation, Cell Biology, Biophysics, and General Biology. Research Methodology

**Laboratory Courses Involved:** Cell and Tissue Culture Tech. (includes the Laboratory Component)  
Measurement Techniques-I (Core level Laboratory)  
Genetic Engineering (Higher level Laboratory)

**(b) Resource person for various programs:**

Program	Venue	Duration
1. AICTE-ISTE Short term training programme on Molecular Biology techniques in Biotechnology	Birla Institute of Technology & Science, Pilani	Dec. 18-30, 2000
2. AICTE Staff Development Program on Nanotechnology	Vivekanandha College of Engineering for Women, Trichengode, TN	June 1-14, 2011
3. AICTE-LSFI Workshop on Nanotechnology	MIET, Meerut	Nov 22-26, 2011

**(c) Research Experience:**

1986-1987	Research Assistant	ICMR Center for Advanced Studies on Genetic Diseases, King George's Medical College, Lucknow
1989-1990	Scientist Fellow	National Botanical Research Institute, Lucknow
1991-1993	Scientist (DST-Young Scientist's Project)	CSIR Complex (now Institute of Himalayan Bioresource Technology), Palampur.
1997	Visiting Scientist	Microgravity & Cell Polarity Project, San Francisco, USA
2001-2002	Post Doctoral RA	Department of Botany, OSU, Stillwater, OK, USA
2002-2004	Post Doctoral RA	Dept. of Biological Sci., Purdue University, West Lafayette, IN, USA
2004-2006	Research Scientist	Nanon Technologies Laboratory, Purdue Discovery Park, West Lafayette, IN USA

**(d) Honorary Positions:**

1	Nanon Technologies Inc., Purdue, WL, USA	Research Specialist (Ion Channel)	2006-till date
2	Biosensor Academy, MVSU, Moscow	Honorary Professor	2006-till date
3	Indo Asian Academy Bangalore	Quantum NanoScientific Chair Visiting Professor in Nanobiotechnology	2010-till date

**(e) Principal Investigator of various sponsored Projects:**

Title of the Research Projects	Sponsoring Agency
1 Studies on the effect of magnetism on plants	Indian Association of College Going Scientists, Calcutta
2 Studies on the effect of weak electric current on growth and differentiation in tissue culture	Department of Science & Technology, Govt. of India, New Delhi
3 Electrical influence on physiological changes with organogenesis in tissue culture	University Grants Commission, Govt. of India, New Delhi
4 Studies on the electrical resistances of graft union in Rose	University Grants Commission, Govt. of India, New Delhi
5 Studies on the electrical coupling in root hairs	University Grants Commission, Govt. of India, New Delhi
6 Large scale cultivation of plant cells for production of medicinally important compounds	Department of Science & Technology, Govt. of Rajasthan, Jaipur
7 Studies on the Biochemical response of electrical signaling in the reproductive system of <i>Hibiscus rosa sinensis</i>	University Grants Commission, Govt. of India, New Delhi

**(f) Team Member in various sponsored research projects:**

	<b>Project Title</b>	<b>Sponsoring Agency</b>
1	Genetic counseling and prenatal diagnosis of various genetic diseases	Indian Council of Medical Research, Govt. of India
2	Tissue culture of <i>Shorea robusta</i> and <i>Populus deltoids</i> : Development of technological know how	Department of Biotechnology, Govt of India
3	Studies on the Bioremediation of heavy metals using cyanobacteria with special reference to nuclear wastes	BRNS, Department of Atomic Energy, Govt. of India

**(g) First-Degree Thesis Supervised:**

	<b>Name of the students and Thesis Degree</b>	<b>Title of the Thesis</b>
1	Mr. MSKR Chakravorthy B.E. (Computer Sc.)	Computer Optimization of Plant Tissue culture production.
2	Mr. KG Srikumar B.E. (Chemical Engg.)	Analysis and design of Bioreactors – with special emphasis to optimization.
3	Mr. Bhavin C. Shah B.E. (Chemical Engg.)	Tissue culture of <i>Vinca rosea</i> – with special reference to the technological problems in large culture volume.
4	Mr. M. Sunil Kumar M.Sc. (Biological Sc.)	Mathematical modeling of neurons and neurocomputers.
5	Miss N. Prathibha B.E. (Chem. Engg.)	The magnetically stabilized Fluidized bed: A novel bioreactor for Plant Tissue Culture
6	Miss Jaya T. Chari B.E. (Chem. Engg.)	Mathematical Modeling and simulation studies on Tumbling reactor with special reference to phototrophic organism
7	Mr. Suresh Emmanuel B.E. (EEE)	Digital signal processing of heart sounds: A diagnostic tool
8	Ms Pragati Sahai M. Phil (Biotechnology)	The effect of external EMF on cell volume in <i>Nicotiana tabaccum</i> and on pollen tube growth in <i>Lillium longiflorum</i> in presence of GABA

**(h) Doctoral Thesis Advised:**

<b>S.N.</b>	<b>Name of the students and Thesis Degree</b>	<b>Title of the Thesis</b>	<b>University</b>
<b>Completed:</b>			
1	Ms. Jingwei Yin	Role of endocytosis at pollen tube tip during calcium influx	Purdue Uni, West Lafayette, IN, USA
2	Mr. Ashok Kumar Mishra	Studies on the development of an electrical Biosensor for the Measurement of the Graft Union Success Rate in Biophysical Systems	DDU Gorakhpur Uni
3	Ms. Suchi Smita	Identification of suitable target for GsMTx-4: A venom peptide from <i>Tarantula</i> for treatment of High Blood Pressure	Integral University, Lucknow
4	Ms. Shilpi Srivastava	Studies on the Biosynthesis of silver nanoparticle using fungi immobilized system for its anti-bacterial activity	Integral University, Lucknow
<b>Ongoing:</b>			
5	Mr. Vikas C. Gupta (probably withdrawn)	Bioengineering Analysis for Secondary Metabolite Production using hairy root culture system	Shobhit University, Meerut
6	Mr. Srikant Awasthi (probably withdrawn)	Investigation of miRNA regulation on Breast Cancer Proteomics Network using System Biology Approach	Shobhit University, Meerut
7	Ms. Aditi Singh	Characterization of calcium ion channels in two different perspectives- Pulsatile activity of cardiac tissue & cell growth and funding the specificity of these calcium ion channels blockers	IFTM University, Moradabad
8	Ms. Priyanka Shukla (probably withdrawn)	Docking and QSAR studies of Breast Cancer Protein with novel drug candidates for cancer prevention in Human	IFTM University, Moradabad
9	Mr. Nabeel Ahmad (Thesis submitted)	Development and Kinetic analysis of L-asparaginase-QD-Conjugates for early detection of cancer in mouse models	IFTM University, Moradabad
10	Ms. Ankita Lal	Development of green root cell lines in certain medicinally important plant species and its kinetic studies	Graphic Era University, Dehradun
11	Mr. Anil Pandey	Validation and Optimization of Leads against Fab enzyme regulating in <i>Plasmodium Falciparum</i> : An <i>In silico</i> study	Shri Ramswaroop M. University, Barabanki

### **(i) Editorial Board/Review Committee Member for Journals:**

1. Biotechnology
2. American Journal of Plant Physiology
3. Asian Journal of Cell Biology
4. Asian Journal of Biotechnology
5. Research Journal of Nanoscience and Nanotechnology
6. Journal of Bioelectromagnetism
7. Journal of Plant Sciences
8. Asian Journal of Plant Sciences
9. International Journal of Botany
10. Journal of Biological Sciences
11. Trends in Bioinformatics
12. Ion Channel Update
13. Current Science
14. International Journal of Biotechnology and Life Sciences
15. Ion Channel, Patch Clamp and Electrophysiology Research
16. Journal of Eco-friendly Agriculture
17. Indian Journal of Scientific Research
18. International Journal of Engineering
19. American Journal of Science & Technology
20. American Journal of Microbiology and Biotechnology

### **(j) Representation in the various Academic/ Administrative Committees:**

#### **At BITS, Pilani (1993-2000):**

1. Nucleus Member, Research and Consultancy (R&C) Division.
2. In-charge, Sponsored Research Program at RCD.
3. In-charge, Higher Degree and First Degree Research Program.
4. Member, Research Board.
5. Member Ph.D. entrance committee for Biotechnology.
6. Member, Core Committee, Center for Biotechnology.

#### **At Amity University Uttar Pradesh, Noida (2005-2009):**

1. Member, Academic Council
2. Member, Board of Studies for Biotechnology

#### **At Amity University Uttar Pradesh, Lucknow Campus (2005-2009):**

1. Member, Research Advisory Board
2. Member, Disciplinary Committee
3. Chairman, Purchase Committee for Chemicals and Consumables
4. Chairman, Faculty Recruitment Committee for Biotechnology
5. Member, Faculty Recruitment Committee for Engineering and Technology
6. Member, Committee for Awards of Scholarships
7. Chairman, Academic Excellence Award Committee for Biotechnology
8. Chairman, Departmental Research Committee
9. Member of Selection Committee for:
  - (a) Administrative Executive, Administrative Officer, Front Office Executive
  - (b) Laboratory Demonstrator, Assistants and Attendants
  - (c) Office Assistants and Computer Operators
10. Chairman, Committee for Pest Free Campus

#### **At Shobhit University, Meerut (2009-2011):**

1. Member, Academic Council
2. Member, UGC Inspection Committee
3. Chairman, Board of Studies for Biotechnology
4. Chairman, Commission for Grade Reforms
5. Chairman, Academic Program Committee
6. Member, Committee for Modifying Ordinances for B.Tech., M.Tech. and Ph.D.

### **At IFTM University, Moradabad (2011-2012)**

1. Member, Executive Council
2. Member, Academic Council
3. Member, Planning Board
4. Member, Examination Committee
5. Chairman, Doctoral Research Board
6. Chairman, Board of Studies for Biotechnology
7. Chairman, Faculty Board
8. Member, Pay Revision Committee for IFTMU faculties

### **At Graphic Era University, Dehradun (2012-2013)**

1. Chairman, Ordinance Committee
2. Member, Executive Council and Academic Board
3. Chairman, Board of Studies and Faculty Board
4. Chairman, Departmental Research Committee

### **At SRMU, Barabanki (2013-till date)**

1. Member, Executive Council & Academic Council
2. Chief Coordinator, Internal Quality Assurance Cell (IQAC)
3. Chairman, Curriculum Development Committee
4. Chairman, Choice Based Credit System Committee
5. Academic Advisor, ERP
6. Member, Research Board
7. Chairman, Board of Studies

### **At Other Universities:**

1. Member, Board of Studies for Biotechnology at UP Technical University
2. Advisory Member, Biotechnology Syllabus at Rajasthan Technical University
3. Advisory Member, Biotechnology Syllabus at West Bengal Technical University
4. Member (External Expert), Faculty Board, Faculty of Engineering, Integral University, Lucknow

### **UGC and AICTE Coordination:**

1. Prepared Mandatory Disclosures for submission at AICTE on behalf of Amity Institute of Biotechnology, Lucknow (AIB-L).
2. Coordinated UGC Inspection and documentation for Amity University Uttar Pradesh for its constituent institute AIB-L.
3. Coordinated Inspection and documentation for ISO 9001:2000 and ISO 14000:2004 for Amity Institute of Biotechnology, AUUP, Lucknow.
4. Coordinated Inspection and documentation for ISO 9001:2008 for Shobhit University, Meerut.
5. Coordinated UGC Inspection and documentations for School of Biotechnology, Shobhit University, Meerut (twice).
6. Coordinated UGC Inspection and documentation at GEU, Dehradun.
7. Coordinated UGC Inspection and documentation at SRMU, Barabanki. Appointed Coordinator of UGC Expert Committee visit.

### **(k) Creation of Institutes/ Centers/ Schools:**

1. The Center for Biotechnology was created at the Biological Science Group. I was the Member of the core committee of the center. The core committee comprises eight faculty members from Biological Science, Chemistry, Physics and Pharmacy Groups.
2. Amity Institute of Biotechnology, Lucknow (AIB-L), A constituent institute under Amity University Uttar Pradesh (AUUP) was created in 2005 and I joined as the Faculty, Deputy Director and founder Head of the institute. Since joining I was delegating the duties as officiating Director. At the time of my joining AIB-L total earning was INR 90 lakhs and when I left AIB-L in August 2009 the earning was elevated to over INR 12 crores. I was instrumental in designing and developing all the laboratories at AIB-L and recruitment of faculties. I was also involved in promoting R&D efforts at AIB-L.
3. During my tenure the Center for Advanced Research in Biosensor Technology was created as its founding Director. It was an advance research center in the area of Biosensor and Bioelectronics.
4. School of Biotechnology at Shobhit University, Meerut was created in 2007 and I have taken over as its first Director in August 2009. Since then I was involved in improvement of existing infrastructure and course curriculum. I was instrumental in the creation of Central Instrument Facility of the University. I was also responsible in promoting R&D activities within the School. On behalf of SBT, I have signed three MoUs through the SBT with various companies for training and R&D bilateral collaborations
5. During my tenure the Shobhit University- Quantum NanoScientific (SU-QNS) Center for Excellence in Bio-informatics was created with the help of Melbourne -Chennai based company Quantum NanoScientific and Nanotechnology
6. Signed MoU on behalf of IFTM University, Moradabad with Life Science Foundation of India (LSFI) for Academic and Research collaborations between both centers, ultimately the creation of IFTM-LSFI program on Nano-biotechnology.
7. Appointed as Founding Director at the Institute of BioScience and Technology (IBST) a constituent institute of Shri Ramswaroop Memorial University, Barabanki. Introduced several academic courses at the IBST and developed curriculum for those courses and laboratories.

### **Organization of Conference/Seminar/ Workshops as Chairman/ Convener:**

1. Workshop on Bioinformatics Techniques organized jointly with Bioinformatica Solution, Lucknow at Amity Institute of Biotechnology-Lucknow (AIB-L) in October 26, 2005.
2. National Conference on Nano-biotechnology in joint collaboration with NBRI-Lucknow hosted partly at NBRI and AIB-L in March 22-25, 2006.
3. National Seminar on Genomics and DNA Finger Printing at AIB-L on September 1-2, 2007.
4. International Conference on Nanoscience and Nanotoxicology jointly with Indian Nanoscience Society and IITR-Lucknow (AIB was Academic partner)
5. National Conference on Eco-friendly Agriculture jointly with DKVS-Lucknow at AIB-L November 28-30, 2008.
6. National Seminar on Nanotechnology organized at Shobhit University, Meerut on March 23, 2010.
7. National Conference on Genes and Genomes at Shobhit University, Meerut August 28-29, 2010.
8. National Workshop on Drug Discovery at Graphic Era University on November 10-12, 2012.
9. National Conference on BioMechanics and Annual Meeting of Society of BioMechanics-India, April 1-3, 2013.
10. International Conference on Advances in Biophysics (ICAB-2015), Suzhou, China March 18-20, 2015 **(Technical Program Committee Member and Invited speaker).**
11. Conferences on Advances in Cell Biology (CACB-2015), Reston, VA, USA; March 20-23, 2015 **(Technical Program Committee Member).**
12. International Conference on Biochip, Biosensor and Bioelectronics (ICBBB-2015), Shanghai, China; September 18-20, 2015 **(Technical Program Committee Member and Invited speaker and session chairman)).**
13. 6<sup>th</sup> World Conference on Biotechnology, New Delhi; October 5-7, 2015 **(Organizing Committee Member and invited speaker).**

14. Conferences on Advances in Cell Biology (CACB-2016), Los Angeles, CA, USA; March 18-20, 2016 (**Technical Program Committee Member and Invited speaker**).
15. International Conference on Advances in Biophysics (ICAB-2016), Los Angeles, CA, USA March 18-20, 2016 (**Technical Program Committee Member and Invited speaker**).

**Organized a Faculty Development Program** with Theme: Interactive sessions on Effective Teaching- Learning Process at SRMU, Barabanki; July 6-11, 2015.

## PROFESSIONAL AFFILIATIONS

- |  |   |
|--|---|
| 1. International Association for Plant Biotechnology           | 10. Indian Society of Biomechanics                  |
| 2. Indian Science Congress Association                         | 11. Indian Nanoscience Society                      |
| 3. Indian Biophysical Society                                  | 12. The Biotech Research Society of India           |
| 4. Indian Society for Technical Education                      | 13. Society of Biotechnologists in India            |
| 5. Indian Association of Nuclear Chemists and Allied Sciences. | 14. Society of Plant Biochemistry and Biotechnology |
| 6. New York Academy of Sciences                                | 15. New York Academy of Sciences                    |
| 7. Sigma Xi- The Scientific Research Society                   | 16. Institute of Nanotechnology, Sterling           |
| 8. Indian Society of Cell Biology                              |   |
| 9. Biomedical Engineering Society of India                     |   |

## ACCREDITATIONS

1. Recipient of most prestigious Creativity Encouragement Program for Young Scientists project award from Ministry of Science and Technology, Govt. of India in 1989.
2. Elected Member of the National Academy of Sciences, India.
3. Elected Fellow of the Indian Society of Genetics and Plant Breeding.
4. Delivered ISCA Young Scientists Award Lecture 1992 and 1993.
5. Received Society of Bioscience Lecture Award-1996.
6. Received Young Scientist's Award Gold Medal -1997 at the 35<sup>th</sup> World Congress of Natural Medicines, Tirupati.
7. Received Ministry of Science and Technology, Govt. of India Travel Abroad Grants for Young Scientists.
8. Received Junior Chamber International (JCI) -Outstanding Young Persons Award (Trophy)- 1998.
9. Recipient of Ministry of HRD, Govt. of India Scholarship (1987-1989) and Department of Biotechnology Fellowship (1989-1991).
10. Recipient of Dr. Ramesh Gulrajani Memorial Award-2006 for Outstanding Research in Electrophysiology by the International Society for Bioelectromagnetism, Minneapolis, MN, USA
11. Visited Germany, Japan, Singapore, Sri Lanka, Thailand, UK and USA to deliver lectures, attending conferences and research activities.

## Patent Published

**Title of Invention:** Electrical biosensor for early detection of graft compatibility in plants

**Inventors:**

1. Rajiv Dutta
2. Ashok Kumar Mishra

**Application No. :** 706/DEL/2009, C.B. R. No. 2636.

Patent # 31481 (The Patent Office Journal October 2010 page # 126) "Electrical Biosensor for Early Detection of Graft Compatibility in Plants" with International Classification G01N27/00.

## Patent Applications submitted

**Title of Invention:** Development and preparation of Hybrid Hydrogel Silver Nanoparticles with immobilized L-asparaginase.

**Inventors:**

1. Nabeel Ahmad
2. Rajiv Dutta

**Application No.:** 2714/DEL/2013 dated September 18, 2013



## Patent Applications under process of submission

**Title of Invention:** Development and preparation of Hybrid Hydrogel Gold Nanoparticles with immobilized L-asparaginase.

**Inventors:**

1. Nabeel Ahmad
2. Rajiv Dutta

## Patent Ready for Filing

The research shows that peptide GsMTx4 isolated from venom from spider *Grammostola*, has unique quality to stop pollen tube growth instantly at certain concentration and condition. This technology be may be used for breeding purpose as an alternative to emasculation of anthers.

## Research Accomplishments

Dr. Dutta along with Prof. Robinson discovered stretched activated (SA) calcium channel in growing pollen tube tip and its role into polarized pollen tube growth. It was for the first time the stretched activated ion channel reported in plant system. (Reference: Plant Physiology, 135, 1398-1406, 2004). The said accomplishment was appeared as Research Highlights in NATURE (430; 416). This research was carried out in close association with Prof. OP Hamill of Cornell University (for pressure clamp), Prof. Frederick Sachs of SUNY at Buffalo (for spider venom and peptide GsMTx4) and Prof. Roger Y. Tsein of UCSD (Nobel Laureate: Chemistry 2008) (for GFP-Ca<sup>2+</sup> analysis in growing pollen tube). At present carrying out research on bioinformatics studies on structural identification and correlation between SA calcium channels in pollen and peptide GsMTx4.

Dr. Dutta was also involved in electrophysiological studies for identification and characterization of various ion channels in cytoplasmic and vacuolar membrane of Arabidopsis and Barley, proved that K<sup>+</sup> channel KCO1 is involved in formation of slow activating vacuolar (S-V) channels. This research was carried out at three different centres in two different countries and coordinated by Prof. R. Hedrich, one of the group members of Prof. E. Neher, Nobel Laureate: Medicine and Physiology 1991). (Reference: FEBS Letters 511, 28-32, 2002). This research was carried out in collaboration with Prof. Roderick MacKinnon of the Rockefeller University (Nobel Laureate: Chemistry 2003) for voltage gated K<sup>+</sup> channel) and Prof. Roger Y. Tsein of UCSD (Nobel Laureate: Chemistry 2008) (for GFP expression with KCO1).

Dr. Dutta's research group has developed a biosensor based on semiconductor device for early deduction of graft success in plants (Rose, mango etc.). (Patent Filed Application no. is 706/DEL/2009, C.B.R. No. 2636, 2009).

Dr. Rajiv Dutta showed experimentally that while differentiation process from undifferentiated tissues in plants certain amount of natural endogenous electrical potential of the tissue, in reference to the medium on which it is growing was required. The tissues with natural electrical potential difference of lesser -80 mV were readily differentiated, as the potential difference goes positive, the regeneration capacity falls. (Reference: BEMS Letters 137, 210-214;, 1998).

Dr. Dutta proved that the weak electric current of the strength of 1 and 2 microampere augments multifold the growth, differentiation and morphogenesis in plant tissues. (Reference: BEMS Letters 140, 126-129, 2000). He further proved that the cell volumes of iso-diametric and non-iso-diametric cell were also influenced by the said electric current, showing that it is biomass growth. The phenomenon was correlated by the increased movements of certain plant growth regulators. He was instrumental to find out that gravitropism in influenced by the application of exogenous electric current. (Reference: Bioelectromagnetism, 21, 9, 51-54, 2000).

## PUBLICATIONS

### (a) Peer Reviewed:

1. **Dutta, Rajiv** (1994) Computer optimization of relative growth of callus cultures of Poplar (*Populus deltoids*); Modern Trends in Biotechnology; 51-54; CREIID, BITS, Pilani.
2. **Dutta, Rajiv** (1996) Electrically induction of growth, proliferation and differentiation: A novel *in vitro* approach; Bioelectromagnetism **17**; 174-178.
3. **Dutta, Rajiv** (1996) Electrical influence on the movement of certain PGRs; BEMS Letters **132**; 2-4.
4. Sharma, V.N. and **Dutta, Rajiv** (1996) Mass scale propagation of *Rosa hybrida*; Recent Advances in Biosciences; 211-212.
5. **Dutta, Rajiv** (1997) The immobilized cell reactor for Taxol production from *Taxus baccata*; Journal Society of Bioengineers, India, 2, 41-45 (1997)
6. **Dutta, Rajiv** (1997) Biotechnology in Environmental Management; Environmental Conservation with Sustainable Development (Edited by Dr. A. K. Sinha et al.) Chapter 5; 51-61; APH Publishing Corporation, New Delhi.
7. **Dutta, Rajiv** (1997) Bioelectric augmentation of growth and differentiation in *Nicotiana tabacum*: The physiological evidence to the phenomenon; The FASEB Journal **11(9) Suppl.**; 1031.
8. **Dutta, Rajiv** (1998) Analysis of electrical distribution in callus: A possible marker for differentiation; BEMS Letters **137**; 210-214.
9. **Dutta, Rajiv** (1998) Electrical influence on polar movement of certain phytohormones; Biotechnology in Agriculture and Environment (Eds. S.S. Marwaha et al.); 50-51; PSCST, Chandigarh
10. **Dutta, Rajiv** (1999) Bioelectricity and Plants; Electromagnetic fields in biological system (Edited by Dr. M.H. Weisenseel) pp. 98-100; Alan R Liss, New York.
11. **Dutta, Rajiv** (1999) Measurement of *in vitro* growth by image processing; Comp. Biol. Applications; 677-683.
12. **Dutta, Rajiv** (2000) Electrical influence during growth and morphogenesis; BEMS Letters **140**, 126-129.
13. **Dutta, Rajiv** (2000) The electrical properties of plant membranes; Bioelectromagnetism **21(1)**, 63-66.
14. Gupta, Amrita and **Dutta, Rajiv** (2000) Electrical control of gravitotropic movement in *Brassica*; Bioelectromagnetism, **21(9)**, 51-54.
15. Schoenknecht, Gerald, Spormaker, Petra, Steinmeyer, Ralf, Bruggeman, Liubov, Ache, Peter, **Dutta, Rajiv**, Reintanz, Godde, Hedrich, Rainer and Palme, Klaus (2002); KCO1 is a component of the slow-vacuolar (SV) ion channel; FEBS Letters **511**, 28-32.
16. Schonknecht, Gerald, Spormaker, P, Steinmayer, R, Ache, P, **Dutta, Rajiv**, Reintanz, B, Godde, M, Hedrich, R and Palme, K; The vacuolar two-pore domain potassium channel KCO1; Plant Biology 2002.
17. **Dutta, Rajiv** and Robinson, K.R. (2003) Identification of stretch-activated channels necessary for pollen germination and growth; Proc. ASCB, F07-F10.
18. **Dutta, Rajiv** and Robinson, Kenneth R. (2004); Identification and Characterization of Stretch-activated Ion Channels in Pollen Protoplasts; Plant Physiology, **135**, **1398-1406**
19. Mishra, A.K., Tiwari, S.N. and **Dutta, Rajiv** (2006) Studies on the development of an Electrical Biosensor to detect the graft union success rate; Wireless Communication & Sensor Network (MacMillan Advanced Research Series) pp. 3-8
20. Mishra, A.K., **Dutta, Rajiv**, Tiwari, S.N., and Tiwari, R.K. (2006) Electrical Biosensor and Measurement of graft union success rate in plant systems: A Review; Applied Botany **ABS 26**, 355-365.
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28. Gupta, Maneesh and **Dutta, Rajiv** (2011) Shoot proliferation, induction of roots in excised shoots and undifferentiated growth in *Kallstroemia pubescens*; Indian Journal of Scientific Research 2(3), 78-84.
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30. Jain, Pankaj Major, Jain, Shikha and **Dutta, Rajiv** (2011) Future prospects of Nanobiotechnology in Veterinary Surgery; In Nanoscience & Nanobiotechnology (Edited by Dr. Pankaj Tyagi *et. al.*), 118-130.
31. Jain, Shikha, Jain, Pankaj Major and **Dutta, Rajiv** (2011) Nanotechnology: Future Prospects in Veterinary Medicine; In Nanoscience & Nanobiotechnology (Edited by Dr. Pankaj Tyagi *et. al.*), 197-205.
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34. **Dutta, Rajiv** (2013) FET Based sensor indentifying and qualifying cellular communication through specialized structure at interfacial cell wall success in plants; J. Biosens. Bioelectron. 4(3), 104.
35. Nabeel Ahmad, Kavya Shree, Monisha Srivastava, **Rajiv Dutta** (2014) Novel rapid biological approach for synthesis of silver nanoparticles and its characterization; International Journal of Pharmacology and Pharmaceutical Sciences; Vol: 1, Issue: 1, 28-31.
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37. Ahmad, Nabeel, Bhatnagar, Sharad, Ali, Syed Salman and **Dutta, Rajiv** (2015) Phytofabrication of bioinduced silver nanoparticles for biomedical applications; International Journal of Nanomedicine; 10 7019–7030.
38. Ahmad, Nabeel, Bhatnagar, Sharad, Dubey, Shyam Dhar, Saxena, Ritika, Sharma, Shweta and **Dutta, Rajiv** (2015) Nanopackaging: A boom of inestimable possibilities; In Nanoscience in Food and Agriculture (Editors: Drs. Shivendu Ranjan, Nandita Dasgupta and Eric Lichtfouse); Springer (Accepted for publication).

### (b) Communicated to refereed journals:

1. **Dutta, Rajiv**; Electrical control of growth in *Nicotiana tabacum*: The Cytomorphological evidence to the phenomenon; Plant Cell Reports.
2. Mishra, A.K. and **Dutta, Rajiv**; Electrical Resistance of Graft Union in Rose: Modeling and Simulation, Planta
3. **Dutta, Rajiv** and Robinson, Kenneth R.; The resemblance of stretch activated ion channel at growing pollen tip with of that found in heart muscles cells; Science

### (c) Invited Lectures:

1. **Dutta, Rajiv** (1992) Electrical control of growth and differentiation in *Nicotiana tabacum* and *Populus deltoides*; Proceedings Part III, Section of Biochemistry, Biophysics and Molecular Biology, 79<sup>th</sup> Indian Science Congress, Vadodra, pp. 11-12 (**ISCA Young Scientist Lecture Award -1992**).
2. **Dutta, Rajiv** (1993) Electro-stimulation of growth, proliferation and differentiation *in vitro*: A novel biological technique; Proceedings Part III, Section of Biochemistry, Biophysics and Molecular Biology, 80<sup>th</sup> Indian Science Congress, Goa, pp. 14-15 (**ISCA Young Scientist Lecture Award -1993**).

3. **Dutta, Rajiv** (1995) Electro stimulation of undifferentiated growth, shoot proliferation and differentiation in plants: A novel biological phenomenon; National Symposium on Recent Advances in Biosciences, Rohtak, November 3-5, 1995 Abstract No. 65. (**Young Scientist Award Lecture**)
4. Prathibha, N, Bhavin C. Shah and **Dutta, Rajiv** (1997) Technological improvement in production of diosgenin through *in vitro* grown callus of *Kallstroemia pubescens*; 35<sup>th</sup> World Congress on Natural Medicines, Tirupati, March 14-16, 1997 (**Young Scientist Award-1997**).
5. **Dutta, Rajiv** (1997) Electrical influence on geotropism in beans; University of SW Louisiana, Lafayette, USA, August 27, 1997.
6. **Dutta, Rajiv** (1997) Bioreactor design and analysis for production of diosgenin; DADE International, Miami, Florida, USA, August 30, 1997.
7. **Dutta, Rajiv** (1997) Protoplasmic fusion under micro gravity; NASA Microgravity Laboratory, Huntsville, USA, August 31, 1997.
8. **Dutta, Rajiv** (1997) Piezoelectricity in bone-A novel factor in healing; World Congress of Integrated Methods in Healings, Colombo, Sri Lanka, November 27, 1997 (Key note address).
9. **Dutta, Rajiv** (1997) Problems during scaling-up of plant tissue culture processes; University of Kandy, Kandy, Sri Lanka, November 28, 1997.
10. **Dutta, Rajiv** (1998) Automation techniques for plant tissue culture; National Institute of Agro biological Recourses, Tsukuba, Japan, June 18, 1998.
11. **Dutta, Rajiv** (1998) Electrical influence during *in vitro* pollen germination in *Hibiscus rosa sinensis*: Understanding the pollination mechanism(s); Center for Cell and Tissue Culture, Kyoto University, Kyoto, Japan, June 27, 1998.
12. **Dutta, Rajiv** (1998) Promoting Scientific Temper: A challenging mission; **OYP-1998 Lecture**, Junior Chamber International, New Delhi, October 26, 1998.
13. **Dutta, Rajiv** (1999) Bioelectric Sensors; Division of Electronics, BARC, Mumbai (27<sup>th</sup> June 1999).
14. **Dutta, Rajiv** (2003) The need of gravitotropism and space biology in India; IIT Kharagpur 50 year celebration at Chicago, June 21, 2003.
15. **Dutta, Rajiv** (2007) Nanopores involved in polarized growth of Lilly pollen tube (Key note address) National conference on Nano, Bio and Information Technology Integration March 23-25, 2007; SIEM, Mathura.
16. **Dutta, Rajiv** (2007) "Oscillating electrical potential at tip region of growing pollen tube: An Indicator to polarized growth"; International Conference on Bioelectromagnetism (ICBEM-2007) Fukushima, Japan October 18-22, 2007.
17. **Dutta, Rajiv** and Robinson, KR (2008) Blocking Pollen growth by peptide GsMtx4: A possible boon for Plant Breeders; National Conference on Eco-friendly Approaches in Sustainable and Horticulture Production, AIB, Lucknow, November 28-30, 2008.
18. **Dutta, Rajiv** (2009) Mechanics of polarized cellular growth in plants; National Conference on Biomechanics, IIT-Roorkee, March 7-8, 2009.
19. **Dutta, Rajiv** (2009) Macro-Engineering Options for Climate change management; National Seminar on Global Warming-Global Warning; RG College, Meerut, Nov, 27-28, 2009.
20. **Dutta, Rajiv** (2009) Bionics: The physico-mechanical technology; National Symposium on Cellular and Molecular Biophysics, CCMB, Hyderabad, January 22-24, 2009.
21. **Dutta, Rajiv** (2010) Patch clamp studies on the soma, dendrite and axons; Brain Awareness workshop, IIIT, Allahabd, March 20-21, 2010.
22. **Dutta, Rajiv** (2010) Biologically inspired nanomaterials; National Workshop on Nanomaterials, Shobhit University, Meerut, March 27, 2010.
23. **Dutta, Rajiv** (2010) Mechanically activated channels in growing pollen tube and its resemblance in heart muscles cells in chick; International Conference on Frontiers in Biological Science, NIT, Rourkela October 1-3, 2010.
24. **Dutta, Rajiv** (2010) Recent Advances in Nanobiotechnology; National Conference on nanotechnology: Current Research Trends and Commercialization; QNS Indo Asian Center for Nanotechnology, Bangalore, October 27, 2010.
25. **Dutta, Rajiv** (2010) Mechano-sensitive voltage gated nanopores: The Physics of polarized cell growth; International Conference on nanobiotechnology: An interface between Physics and Biology, JMI, New Delhi, December 2-4, 2010.
26. **Dutta, Rajiv** (2011) Nanopore Analysis and Patch Clamp Studies on Cell Membrane; AICTE Staff Development Program, Vivekanandha College of Engineering for Women, Trichengode, TN, June 13, 2011.
27. **Dutta, Rajiv** (2011) Identification and Characterization of Membrane Nano-pores; Workshop on Nanobiotechnology: Present & Future Prospective, Meerut Institute of Engineering and Technology, Meerut; November 22-26, 2011 (Resource Person).

28. **Dutta, Rajiv** (2011) Patch Clamp Technique: Past, Present and Future; Workshop on Nanobiotechnology: Present & Future Prospective, Meerut Institute of Engineering and Technology, Meerut; November 22-26, 2011 (Resource Person).
29. Jain, Pankaj Major, Jain, Shikha and **Dutta, Rajiv (2011)** Future Prospects of Nanotechnology in Veterinary Surgery; National Seminar on Nanoscience and Nanobiotechnology: Present & Future Perspectives; Meerut Institute of Engineering and Technology, Meerut; November 26, 2011.
30. **Dutta, Rajiv** (2012) Mechano-sensitive Membrane Nanopores and Polarized Cell growth; National Conference on Newer Horizons and Innovations in Biotechnology & Biosciences (NHIBB-2012), April 7-8, 2012, Faculty of Engineering and Technology, RBS Engineering Technical Campus, Agra.
31. **Dutta, Rajiv (2013)** FET based Sensor Identifying and Quantifying Cellular Communication through Specialized Structure at Interfacial Cell Wall for Graft Success in Plants 2nd International Conference on Biosensor & Bioelectronics, June 17-19, 2013, Chicago, USA.
32. **Dutta, Rajiv (2013)** Membrane Stretched Activated Nanopores 13th IEEE International Conference on Nanotechnology; August 5-8, 2013, Beijing, China.
33. **Dutta, Rajiv (2013)** Bionics: Lesson from Nature; International Conference On Advances In Biotechnology And Bioinformatics (ICABB 2013) and X Convention Of The Biotech Research Society, India (BRSI) 25–27 November 2013, Pune, India.
34. **Dutta, Rajiv (2013)** Bioproduction of AgNP and AuNP: An novel eco-friendly process development; 5<sup>th</sup> National Conference on Nanotechnology and Nanomaterials, Lucknow, Nov. 21-23, 2013.
35. **Dutta, Rajiv** (2014) Discovery of Nanopores involved in cell elongation; International Conference on Life Science (ICLS-2014), Vijayawada, January 24-25, 2014.
36. **Dutta, Rajiv (2014)** Nano Conjugates: A Novel way to produce AgNP-Hydrigel-LASP; International Conference on Biodiversity, Bioresource and Biotechnology; Mysore; January 30-31, 2014.
37. **Dutta, Rajiv (2014)** Membrane Nanopores: Mechanosensitive Ion channels and its role in cell elongation; National Conference on Prospective & Trend in Plant Science and Biotechnology; Chandigarh, February 21-22, 2014.
38. **Dutta, Rajiv** (2014) Patch clamp Technique in Nano Drug Discovery; National Workshop on Nanomedicine: Role of Nanomedicines as therapeutic agents against multi-drug Resistant Pathogens; Integral University, Lucknow; March 7-9, 2014.
39. **Dutta, Rajiv (2014)** Mechanosensitive Ion channels responsible for cellular elongation; International Biophysics Congress 2014-Satellite Symposium Mechanosensory Transduction, Queensland, Australia, July 31st to August 2nd, 2014.
40. **Dutta, Rajiv (2014)** Development of LASP-AgNP-HG conjugates for diagnostics and management of Acute lymphoblastic leukemia (ALL); NANOCON-2014 the 3rd International Conference on Nanotechnology, Bharati Vidyapeeth University, Pune, October 14-15, 2014.
41. **Dutta, Rajiv (2014)** Calcium influx through pressure activated membrane channels; XXXVIII All India Cell Biology Conference, CDRI, Lucknow December 10-12, 2014.
42. **Dutta, Rajiv (2015)** Role of Pressure Sensitive Ion Channels in Cellular Elongation: The Biophysics of Membrane Physiology; International Conference on Advances in Biophysics, Suzhou, China March 18-20, 2015.
43. **Dutta, Rajiv (2015)** Mechano-Sensitive Channel Responsible for Cellular Elongation; Conference on Advances in Cell Biology; Reston, Virginia, USA, March 20-22, 2015.
44. **Dutta, Rajiv (2015)** Biomarker Based on Interfacial Electrical Resistance produced by Plasmodium: A Novel Technology in Hybrid Breeding; 6 International Conference on Biomarkers and Clinical Research, Toronto, Canada, August 31 to September 2, 2015.
45. **Dutta, Rajiv (2015)** FET based Bio-Sensor for measuring Cellular Communication through Inter-facial Cells for identifying Graft Success rates in Plants; International Conference on Biochips, Biosensors and Bioelectronics, Shanghai, China Sept 18-20, 2015.
46. **Dutta, Rajiv (2016)** Nanopore biophysics: The mechanism of cellular elongation; 2nd International Conference on Advances in Biophysics (ICAB 2016 ), Los Angeles, USA, March 18 to 20, 2016.
47. **Dutta, Rajiv (2016)** Role of Weak Electrical Current in Cell Elongation: The Novel Phenomenon in Cellular Differentiation, 2nd Conference on Advances in Cell Biology (CACB 2016), Los Angeles, March 18 to 20, 2016.