

## Curriculum Vitae: Professor Sunil Bhand



- Name: Sunil Bhand, Ph.D.
- Designation: Professor of Chemistry
- Administrative: Dean (University wide)  
Sponsored Research & Consulting
- Organization: Birla Institute of Technology & Science, Pilani  
-K.K. Birla Goa Campus, Goa, PIN 403726, INDIA

- Contact Information

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- Areas of Research interest:

analytical and bio-analytical chemistry, biosensors, Bio-MEMS, Biochips, microfluidics for chemical and biological analysis, metal speciation, high throughput screening, pesticide residue analysis, aflatoxin detection, antibiotic analysis, milk, water & waste water analysis, thermal, optical and piezoelectric biosensors, Electrochemical Impedance spectroscopy, enzyme and immunosensors, multianalyte analysis, field portable devices & kits.

- General information:

Dr Sunil Bhand carried out his doctoral research on Industrial effluent analysis with reference to heavy metal speciation in aquatic environment and sediments in 1996. He worked as post-doctoral research associate at the Department of Pure and Applied Biochemistry, Lund University Sweden (2001-2002) with Prof. Bengt Danielsson. He had received significant funding and executed various national and international projects from Council of Scientific & Industrial Research CSIR, N Delhi, The Swedish Research Council, VR (Sweden), Indian Council of Agricultural Research ICAR, Govt. of India & The World Bank USA, Department of Science & Technology Govt of India DST, N. Delhi (FIST), Defence Research and Development Organization DRDO (as Co-PI) and, Indo-UK (UKIERI- DST as Co-PI). He is currently leading a consortia project under National Agricultural Innovation Project NAIP, with multi-institute partners (BITS Pilani, IIT Delhi, NDRI Karnal, PU Patiala) with funding of INR. **32 crores (USD 5 MILLION)** for the period Jan **2008-June 2014**. He actively collaborates within and outside the country (Sweden: Prof B Danielsson, Prof Magnus Willander, Dr Cedric Dicko; France with group of Prof J-L MARTY and UK group of Prof Paul Millner). He had established a state of the art biosensor laboratory at Goa, India. He has supervised 3 Ph.D. thesis and 4 are ongoing, reviewer and referee for several international journals as well as member of editorial board. He had published more than 35 research papers and is inventor in **6 patents including 3 International**. He had also presented more than 40 research papers in national and international conferences (within India and abroad). He had visited Canada, Germany, USA, France, Sweden, UK, China, Turkey and Mexico and Australia on academic assignments. Prof Bhand had also developed new courses both at undergraduate and doctoral level. Prof Bhand had organized 04 international conferences in the area of biosensors at Goa (during 2006, 2007 and 2013 & May 2014).

- Personal Information:  
Date of Birth: March 17, 1969  
Nationality: Indian  
Sex: Male  
Marital Status: Married
- Specific Areas of Research interest:
  - Biosensors and bio-analytical chemistry, environmental chemistry, metal speciation
  - Field portable biosensors
  - biochips Prototype development, field kits
- Education:  
  
 Doctoral degree (year, discipline/subject area, dissertation title and supervisor): 1996, Chemistry, Devi Ahilya University, Indore, India. Title of Doctoral Theses: Identification and analysis of cations and anions of industrial effluents. Supervisor: Professor K.K. Chaturvedi, Ph.D., D.Sc.
- Employment Record (Post Ph.D.)
  - i. March 2013- till date Professor, BITS, Pilani-K.K. Birla Goa Campus
  - ii. June 2010 - Feb. 2013 Associate Professor, BITS, Pilani-K.K. Birla Goa Campus
  - iii. June 2006 - May 2010 Assistant Professor, BITS, Pilani-Goa Campus
  - iv. Jan. 2005 - May 2006 Lecturer, BITS, Pilani-Goa Campus
  - v. Dec. 2002- June 2005 Lecturer, BITS, Pilani - Pilani campus
- **Administrative Experience at BITS, Pilani**
  - i. Dean (University wide) June 16- till date  
Sponsored Research & Consulting
  - ii. Associate Dean Jan 16, 2014-ongoing  
Sponsored Research & Consulting
  - iii. Nominations Committee of Senate March 24, 2014 (1 year)
  - iv. Head of the Department,  
Department of Chemistry 2009- Nov.21, 2013
  - v. Group Leader, Chemistry 2006-2009
  - vi. Convener, Addl. Competitive Grant by BITS 2014-2016
  - vii. Coordinator, ABG sponsored Industry projects 2011  
(For BITS Pilani University)
  - viii. Coordinator, Seed grant 2 project review
  - ix. Convener, Departmental Research Committee 2010 -Jan 2014
  - x. Member, Senate 2010 onwards
  - xi. Appointed Member of Research Board 2012 onwards
  - xii. Chairman Department of Chemistry 2014-  
Campus level short listing committee,
  - xiii. Task Force leader -Research and Consultancy 2009-2012  
(under Vision 2020 Mission 2012)(consultancy & marketing)
  - xiv. Member Institute Level Anti Ragging Committee 2014, 215
  - xv. Institute Biosafety Committee 2015-16

- **Visits Abroad:**
  - i. Guest Researcher (3 months each) 2003, 2004, 2005, 2007 & 2009 Department of Pure and Applied Biochemistry, Lund University **Sweden**. Funded by the Swedish Research Council.
  - ii. Collaborative visit 2005 University of Wuhan & Institute of Virology, Chinese Academy of Science Beijing, **China**
  - iii. Visiting Scientist 2011 Acromed Invest AB, Lund, **Sweden** (short term outsourcing visit) Funded by Indian Council of Agricultural Research, ICAR, and Government of India.
  - iv. Faculty Opponent Ph.D. thesis 2011 ITN, Linköping University **Sweden**
  - v. Visiting Scientist 2013 FBS, University of Leeds UK (UKIERI-DST) Project 2013/14
  - vi. Participation in International Conferences in Edmonton Canada (1995) Hamburg, Germany 1995, Uppsala, Sweden 2003, Grenoble France 2003, Berlin, Germany 2004, Kusadasi Turkey, 2006, Bristol UK 2009, Glasgow UK 2010, Strasbourg France 2011, Cancun Mexico 2012 and Melbourne Australia 2014.
- **Ph.D. thesis supervised**
  1. Dr. Kanchanmala B Deshpande **awarded 2012** (as Supervisor).
  2. Dr. Rupesh Kumar Mishra, **awarded 2013** (as Supervisor)
  3. Dr. Lizy Kanungo, **awarded 2014** (as Supervisor)
  4. Geetesh Kumar Mishra **awarded June 2015** (as supervisor)
- **Ph.D. thesis submitted**
  5. Gautam Bacher (submitted **May 2015**) reports received (as supervisor)
  6. Souvik Pal (**Submitted April 2015**) (as supervisor)
- **Ph.D. thesis (ongoing)**
  7. Mr Atul Sharma (as supervisor) Co-Supervisor Prof J-L MARTY (UPV France)
  8. Mr. Arun Prushty (as supervisor)
  9. Ms. Aruna Singh (as supervisor)
- Examiner for evaluation of Ph.D. thesis from following Institutes
  - i. Linköping University, Sweden (Department , ITN), as opponent
  - ii. IIT Roorkee (Department of Biotechnology), as opponent
  - iii. IIT Bombay (Department of Biotechnology)
  - iv. University of Kolhapur (Department of Chemistry) as opponent
  - v. Punjabi University Patiala (Department of Biotechnology)
  - vi. University of Mumbai (Department of Biotechnology, BARC)
  - vii. NIT Durgapur (Department of Chemistry) as opponent
- **Technologies Developed:**
  - i. A device for high throughput screening of pesticide residues in milk. Patented technology under ownership of ICAR, Govt of India.
  - ii. An online biosensor for urea adulteration detection in milk. (Validated).
  - iii. A device for analysis of mycotoxins (patented under ownership of ICAR, Govt of India)
- **Honours and Awards**
  - i. Member, expert committee (international program) Department of Biotechnology, Govt of India (2014-17).
  - ii. Member, National Advisory Committee, 5<sup>th</sup> SERC School on “Developments in Microfabrication with Focus on Synchrotron Radiation based Deep X-ray Lithography” RRCAT Indore 2012.

- iii. Received certificate of appreciation from American Chemical Society ACS USA as a reviewer for ACS Journals 2012.
- iv. Faculty opponent at the Department of Science and Technology, Linköping University Sweden, Dissertation No. 1376 Sept 02, 2011.
- v. Appointed member of the editorial board for the journal “Chemical Sensors” 2011.
- vi. Received certificate of appreciation from ICAR, Govt. of India at “National Meet on Technology Innovation in Agriculture” New Delhi, 2009.
- vii. Invited key note address on Bio-MEMS at the 1st Indo-German Frontiers of Engineering Symposium, organized by Alexander von Humboldt Foundation Germany & DST India. IIT Madras Nov. 2009.
- viii. Co-Chairman, the 8<sup>th</sup> IAEAC sponsored workshop on biosensors at BITS Goa 2007.
- ix. Convener, Indo-Swedish Workshop on Biosensors at BITS Goa 2006.
- x. Best research paper award (USD600) from International Society for Trace Element Biogeochemistry ISTEBC, at 7th International Conference on Biogeochemistry of Trace Elements Uppsala University Sweden 2003 & Conference scholarship for early career scientists USD1000 at 7th ICBTE Uppsala Sweden 2003.
- xi. Recipient of Dr. U.V. Rao memorial Young Scientist award in Analytical & Environmental Chemistry, by Indian Chemical Society 1999.

- **Reviewer for International Journals:**

Biosensors and Bioelectronics (Elsevier). J. Agri Food and Chemistry (ACS, USA), Lab on Chip and Nanoscale Research (RSC), Anal.Chim Acta. (Elsevier), Biochemical Engg. Journal, Applied Biochemistry and Biotechnology, Analytical and Bioanalytical Chemistry (Springer), , Chemical Sensors, Analytical Letters,.

**Reviewer for sponsored projects by external funding agencies**

- i. Department of Biotechnology, Govt. of India, Department of Science and Technology Govt of India,
- ii. Indian Council for Agricultural Research (Ministry of Agriculture) ICAR for both National Agricultural Innovation Project and NFBSFARA Project of ICAR Govt of India.
- iii. Prof Bhand is also member of expert committee for Biosensors 2014-2017 for Bilateral International Projects of Department of Biotechnology, DBT Govt of India.

- **Membership in professional societies**

- i. Affiliate Member IUPAC 2004, 2005, 2006 and 2007, 2008
- ii. American Association for the Advancement of Science AAAS USA since 2012 –till date.
- iii. American Chemical Society (by invitation three years 2007, 2008, 2010)

- **RESEARCH PROJECTS (Ongoing and completed)**

**Ongoing Sponsored Research Projects**

1. **Multi-institute Consortium Project** entitled “**Imprinted polymer for sensing and removal of selected antibiotic and pesticide residue**” Project no. NFBSFARA/PHT-4007/2013-14

Funding Agency: National Funds for Basic and Strategic Research in Frontier Areas of Agricultural Science, ICAR, New Delhi

· **BITS, Pilani-KK Birla Goa Campus: Prof. Sunil Bhand (Principal Investigator)**

- BITS Goa, Co-Investigator (Prof. NN Ghosh)
- NDRI Karnal: Dr. Y.S. Rajput (Cooperating Centre PI, CCPI)
- IIT Delhi: Prof Sudhir Chandra (Cooperating Centre PI, CCPI)
- Total Sanctioned Amount: **Rs. 125.25511 Lakh,**
- **Project Funding Period:** 1<sup>st</sup> October 2013 to 31<sup>st</sup> March, 2015.
- BITS, Pilani-Goa Campus funding share **Rs. 54.39110 lakh**

**2. Title of the project: “Development of field portable device for the analysis of contaminant in water” funded by BRNS, DAE Govt of India No. Ref No: (36)/14/25/2014-BRNS-445**

- Funding & duration: Rs. **24.138 lakh** : 3 years (start June 2015), Staff: 1 SRF
- **Principal Investigator : Prof. Sunil Bhand** ( Dept of Chemistry, KK Birla Goa Campus)
- Principal Collaborator: Dr R. Balasubramaniam, Ashwin Rathod (PED, BARC) Dr VK Suri (MGM,Mumbai)

**3. Centre of Research Excellence in Water, Waste water and Energy Management (CORE WWEM) funded by BITS, Pilani.**

- **Subproject title: Development of Field Deployable biosensor for analysis of bacterial contaminant in potable water**
- Funding to sub-project : Rs. 41 lakh, Duration : 3 years (2014-2017)
- Name of **Co PI : Prof. Sunil Bhand** ( Dept of Chemistry, KK Birla Goa Campus) biosensor
- Co-Investigator(s) I: Prof. Utpal Roy (Dept of Biological Sciences, K.K. Birla Goa Campus) microbiology.
- Co-Investigator(s) Prof. Neeru Sood & Dr Turpti Gokhale : (: Biological Science, Dubai Campus)

**3. International (Indo-UK)**

Joint Indo-UK project under UKIERI-DST Thematic research awards 2012, “Development and characterization of nanomaterials for biosensors and biocatalysts” (reference number INT/UK/UKIERI/P-41/2013)

- Duration 2 years (May 2013-May 2015)
- **Funding agency: UKIERI** (DST and British Council) **Amount: Rs 91 lakh**
- PI- UK: Prof Paul Millner (Faculty of Biological sciences) biocatalysis
- Indian PI BITS Goa: Prof. NN Ghosh (Department of chemistry) nanomaterials
- Co-PI BITS Goa: Prof Sunil Bhand (Department of Chemistry) nanobiosensors

**5. International: Swedish Research Council**

- Title: Functional composite materials and their application in smart textiles
- Funding Agency: The Swedish Research Council Duration: 3 years (2014-2017)
- PI : Dr. Cedric Dicko, Pure and Applied Biochemistry, Lund University Sweden
- Invited PI: Prof. Sunil Bhand (funding for Exchange visit of PI and researcher), BITS Goa

## Completed Research Projects

1. **Multi-institute Consortium Project entitled “Development of biosensors and micro techniques for analysis of pesticide residues, aflatoxin, heavy metals and bacterial contamination in milk Project no. Comp 4/C10125.**

**Funding Agency: National Agricultural Innovation Project, ICAR, India & The World Bank USA.**

§ **BITS, Pilani-KK Birla Goa Campus: Prof. Sunil Bhand (Consortium PI)**

§ NDRI Karnal: Dr. Naresh Kumar Consortium (partner)

§ IIT Delhi: Prof Sudhir Chandra & Prof Ratnamala Chatterjee (partner)

§ Punjabi University Patiala: Prof Neelam Verma (partner)

· **Total Revised funding ₹ 3107.318 lakh (USD 5 Million approx)**

· **Project Funding Period: Feb 2008- June 30, 2014.**

· **BITS, Pilani-Goa Campus funding share Rs. 450.4799 lakh**

2. **Multiinstitute Consortium Project entitled “Detection and mitigation of dairy pathogens and adulterants using chemical biology, Project No. C4/C30032**

Funding Agency: National Agricultural Innovation Project “NAIP’ financed by ICAR (Govt of India & The World Bank, USA)

- Total funding amount: **Rs. 695.7363 lakh**
- BITS, Pilani-Goa Campus funding share Rs. 91.34975 lakh
- Funding period February 2009- March 30 2014
- IIT Roorkee: Dr Naveen K Navani (**Consortium PI**)
- **BITS, Pilani-KK Birla Goa Campus: Dr. Sunil Bhand (Consortium Co-PI)**
- NDRI Karnal: Dr. YS Rajput (partner)

3. **International Bilateral (Indo –Swedish):**

Joint Indo-Swedish project entitled “*Validation of field-portable and high throughput biosensor techniques for environmental pesticide analysis*”

- Funding Agency: The Swedish Research Council, Sweden
- Total funding Amount: **Rs. 27.50 lakh (550,000 Swedish Kroner)**
- Funding period: June 2003- Dec. 2007.
- Prof Bengt Danielsson (Principal Investigator, Sweden)  
Department of Pure & Applied Biochemistry  
Lund University, Sweden
- **Dr. Sunil Bhand (Principal Investigator, India)**  
Department of Chemistry  
BITS, Pilani-KK Birla Goa Campus

4. **National:** Novel biosensor techniques for monitoring heavy metals and pesticides in coastal waters and sediments. No. 23(0002)/06/EMR-II

- Funding Agency: Council of Scientific & Industrial Research (CSIR), N Delhi under Monitoring Coastal Hazards program”.
- Total funding Amount: **Rs. 16.5 lakh**
- Funding period: Dec. 2006- March 2010 (3yrs)
- **Principal Investigator: Dr. Sunil Bhand, Department of Chemistry**

5. **Project completed (as Co-Investigator):**

Preparation and characterization of Nano- Ferrite Powders and Polybenzoxazine-Nanoferrite Composite, (ERIP/ER/060/5042/M/01/929) ,

- Funding Agency: DRDO, India
- Funding Period: May 2007-March 2010, Duration (3 years)
- Principal Investigator: Dr NN Ghosh, BITS, Pilani-KK Birla Goa Campus
- **Co-PI: Dr Sunil Bhand, BITS, Pilani-KK Birla Goa Campus**

• **List of publications in peer reviewed journals**

1. Souvik Pal, Sunil Bhand “Zinc oxide nanoparticle-enhanced ultrasensitive chemiluminescence immunoassay for the carcinoma embryonic antigen *Microchim Acta* (2015) **Vol182;1643-1651** <http://link.springer.com/article/10.1007/s00604-015-1489-5>
2. Pal, Souvik; Sharma, Manoj; Chatterjee, Ratnamala; Bhand, Sunil “Multi-platform nano-immunosensor for aflatoxin M1 in milk" **Materials Research Express** (2015) Vol. 2 Number 4; 045010. [doi:10.1088/2053-1591/2/4/045010](https://doi.org/10.1088/2053-1591/2/4/045010) (IOP)
3. Pranali P Naik, Geetesh Kumar Mishra, Bengt Danielsson, Sunil Bhand “Android integrated urea biosensor for public health awareness” *Sensing and Bio-Sensing Research* (2015) **3:12-17** Elsevier, [doi:10.1016/j.sbsr.2014.11.001](https://doi.org/10.1016/j.sbsr.2014.11.001)
4. Rupesh K. Mishra, Gustavo A. Alonso, Georges Istamboulie, Sunil Bhand, Jean-Louis Marty “Automated flow based biosensor for quantification of binary organophosphates mixture in milk using artificial neural network” *Sensors and Actuators B: Chemical* (2015) **208:228-237**, [doi:10.1016/j.snb.2014.11.011](https://doi.org/10.1016/j.snb.2014.11.011)
5. Geetesh K. Mishra, Atul Sharma, Sunil Bhand “Ultrasensitive detection of streptomycin using flow injection analysis-Electrochemical quartz crystal nanobalance (FIA-EQCN) biosensor” *Biosensors and Bioelectronics* (2015) 67:532–539 (SPECIAL ISSUE BIOSENSORS 2014) <http://dx.doi.org/10.1016/j.bios.2014.09.033>
6. Geetesh K Mishra, Gautam Bacher, Utpal Roy, Sunil Bhand “A label free impedemetric immunosensor for detection of Escherichia coli in water” *ScienceJet* (2015) 4:76 <http://www.cognizure.com/sj.aspx?p=200638504>
7. Bhagaban Behera, Souvik Pal, Lizy Kanungo, Sunil Bhand, Sudhir Chandra “Synthesis and characterization of ZnO-ZnAl<sub>2</sub>O<sub>4</sub> whiskers and their application in biosensors” **J. Nanosci. Lett.** (2014) Accepted (Advance online publication), <http://www.cognizure.com/jnl.aspx?p=200638495>
8. Geetesh K. Mishra, Atul Sharma, Kanchanmala Deshpande and Sunil Bhand “Flow Injection Analysis Biosensor for Urea Analysis in Urine Using Enzyme Thermistor”

- Appl Biochem Biotechnol (2014) 174:998–1009.** (DOI 10.1007/s12010-014-0985-0). *Special Issue: India-Japan Workshop on Biomolecular Electronics and Organic Nanotechnology for Environment Preservation '13.*
9. Lizy Kanungo, Gautam Bacher, Sunil Bhand "Flow-Based Impedimetric Immunosensor for Aflatoxin Analysis in Milk Products" **Appl Biochem Biotechnol (2014) 174:1157–1165.** DOI 10.1007/s12010-014-0995-y. *Special Issue: India-Japan Workshop on Biomolecular Electronics and Organic Nanotechnology for Environment Preservation '13.*
  10. Geetesh K. Mishra and Sunil Bhand "Biosensor for urea analysis in adulterated milk" (Invited Article -Special Volume National Agricultural Innovation Project) *Indian Farming* 64(2):115-117, **May 2014.**
  11. Souvik Pal, Manoj Kumar Sharma, Bengt Danielsson, Magnus Willander, Ratnamala Chatterjee, Sunil Bhand "A miniaturized nanobiosensor for choline analysis" **Biosensors and Bioelectronics (2014) 54, 558-564.**  
<http://dx.doi.org/10.1016/j.bios.2013.11.057> [http://www.altmetric.com/details.php?citation\\_id=1964885](http://www.altmetric.com/details.php?citation_id=1964885)
  12. Lizy Kanungo and Sunil Bhand "A survey of Aflatoxin M1 in some commercial milk samples and infant formula milk samples in Goa, India" **Food and Agricultural Immunology (2014) 25(4): 467-476.** <http://dx.doi.org/10.1080/09540105.2013.837031> pp 1-10.
  13. Lizy Kanungo and Sunil Bhand "Fluorimetric Immunoassay for Multianalysis of Aflatoxins" **Journal of Analytical Methods in Chemistry, (2013),** Article ID 584964, 8 pages <http://dx.doi.org/10.1155/2013/584964>
  14. Rupesh K. Mishra, Geetesh K. Mishra, Dharma Teja V, Bengt Danielsson, Sunil Bhand "A visual colorimetric dual readout bioassay for determination of pesticide residues in drinking water" **Chemical Sensors 3 : 12 (2013)** (most viewed article)
  15. Maria Yakovleva, Sunil Bhand and Bengt Danielsson "The Enzyme Thermistor - a Realistic Biosensor Concept (review article) **Analytica Chimica Acta Volume 766, Pages 1–12 (2013)** (front cover image from the article in the journal issue)
  16. Rupesh K Mishra, George Istamboulie, Sunil Bhand, J-L Marty Detoxification of organophosphate residues using phosphotriesterase and their evaluation using flow based biosensor. **Analytica Chimica Acta. 745, 64-69 (2012).**
  17. Gautam Bacher, Souvik Pal, Lizy Kanungo, Sunil Bhand; A label-free silver wire based impedimetric immunosensor for detection of aflatoxin M1 in milk. **Sensors and Actuators B: Chemical, Volume 168, 223–230 (2012).**
  18. Rupesh K. Mishra, Rocio B. Dominguez, Sunil Bhand, Roberto Muñoz, Jean-Louis Marty. A novel automated flow-based biosensor for the determination of organophosphate pesticides in milk. **Biosensors and Bioelectronics 32(1): 56–61 (2012).**
  19. Kanchanmala Deshpande, Rupesh K Mishra, Sunil Bhand, Determination of Methyl Parathion in Water and Its Removal on Zirconia Using Optical Enzyme Assay, **Applied Biochemistry and Biotechnology 164(6):906-917 (2011).**



20. Kanchanmala Deshpande, Bengt Danielsson, Sunil Bhand, Flow injection analysis of choline in milk and dietary supplements using an enzyme thermistor, **Chemical Sensors. 2011; 1(1):16.**
21. Lizy Kanungo, Souvik Pal, Sunil Bhand, Miniaturised hybrid immunoassay for high sensitivity analysis of aflatoxin M1 in milk, **Biosensors and Bioelectronics. 2011; 26(5):2601-6.**
22. Geetesh K Mishra, Rupesh K Mishra, Sunil Bhand, Flow injection analysis biosensor for urea analysis in adulterated milk using enzyme thermistor **Biosensors and Bioelectronics.2010, 26 (4): 1560-1564.** \*Selected Paper from the World Congress on Biosensors,Glasgow, Scotland, UK, 2010.
23. Sunil G Bhand, Srimathi Soundararajan, Ioana Surugiu-Wärnmark, Jaqueline Simona Milea, Estera Sz wajcer Dey, Maria Yakovleva, Bengt Danielsson, Fructose-selective calorimetric biosensor in flow injection analysis;**Analytica Chimica Acta. 2010; 668(1):13-18.**
24. Rupesh K. Mishra, Deshpande Kanchanmala, Bhand Sunil, A High-Throughput Enzyme Assay for Organophosphate Residues in Milk , **Sensors 2010, 10, 11274-11286.**
25. Deshpande Kanchanmala, Rupesh K. Mishra, Bhand Sunil, A High Sensitivity Micro Format Chemiluminescence Enzyme Inhibition Assay for Determination of Hg(II) **Sensors 2010, 10(7), 6377-6394.**
26. Klas Risveden, Kimberly A Dick, Sunil Bhand, Patrik Rydberg, Lars Samuelson, Bengt Danielsson, Branched nanotrees with immobilized acetylcholine esterase for nanobiosensor applications **Nanotechnology. 12/2009; 21(5):55102.**
27. Klas Risveden, Sunil Bhand, J. Fredrik Pontén, Thomas Andén, Nils Calander, Magnus Willander, and Bengt Danielsson, Signal frequency studies of an environmental application of a 65 nm region ion sensitive field effect transistor sensor **Sensors and Actuators B: Chemical. 2007; 127(1):198-203.**
28. Sunil Bhand, Ioana Surugiu, Anatoly Dzgoev, Kumaran Ramanathan, P V Sundaram, Bengt Danielsson, Immuno-arrays for multianalyte analysis of chlorotriazines, **Talanta. 02/2005; 65(2):331-6.**
29. Bhand, Sunil, Yilmaz, E, Danielsson, Bengt, Coupled biosensor, biomimetic and chemometrics strategies for analysis of the metals in complex environmental matrices, **Journal de Physique IV, 2003; 107:169-172.**
30. S.Pirvutoiu, E. Dey, S. Bhand, A. Ciucu, V. Magerau, B. Danielsson, Application of the Enzyme Thermistor for Determination of Mercury and Other Heavy Metals Using Free and Immobilised Alcohol Oxidase. **Roum. Biotechnol. Lett. 2002; 7(6):975-986.**
31. Mukhopadhyay I., Mishra N.N. and Bhand S.G., Prediction of microwave transitions, torsional energies and transition matrix elements of CHD2OD. **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 55(12) 2375-2382 (1999).**
32. Mukhopadhyay I., Bhand S.G. and Mishra N.N., Torsional energies, matrix elements and predictions of microwave transitions in CH2DOD **Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 55(12) 2485-2493 (1999).**

33. S.G. Bhand and K.K. Chaturvedi, AAS and ASV in detection and speciation of cations. **Ind. J. Environ. Prot.** **15(6): 426-429 (1995).**

- **Publications -Peer reviewed conference proceedings**

34. Geetesh K. Mishra and Sunil Bhand\* “FIA-EQCN biosensor for analysis of sulphadiazine residues in milk” **IEEE Proceedings** of “6<sup>th</sup> International Conference on Sensing Technology ICST 2012” with focus on sensors in agriculture, 18-21 Dec. 2012 **Page(s): 672 - 676** DOI: [10.1109/ICSensT.2012.6461762](https://doi.org/10.1109/ICSensT.2012.6461762).

35 G. Bacher, L Kanungo and S. Bhand, Miniaturized label-free impedimetric immunosensor for analysis of Aflatoxin B1 in peanut **IEEE Proceedings** of “6<sup>th</sup> International Conference on Sensing Technology ICST 2012” with focus on sensors in agriculture, 18-21 Dec. 2012 **Kolkata India Page(s): 29-35, DOI: 10.1109/ICSensT.2012.6461690**

36. K. Deshpande, R.K. Mishra, S. Pal, B. Danielsson, M. Willander, S. Bhand, A novel on chip analysis of dissolved Hg(II) in drinking water *Nanotech*2010, 3:133-136.

37. Bhand S, Srimathi S, Danielsson B, Novel Bioanalytical Tools for Environmental Analysis, in Arsenic in the Environment: Biology and Chemistry; Biogeochemistry of trace elements (Eds) Rai Kookana, Mike McLaughlin, Enzo Lombi, Carine Saison, Rebecca Hamon, Sandra Tyrrell, Contribution no 332 (CD-ROM) Adelaide, Australia 2005.

38. Bhand S. and Danielsson B, Potential biosensor techniques for monitoring arsenic contamination and remediation. Proc. Of 7<sup>th</sup> ICOBTE ‘Biogeochemistry of Trace Elements’ George Gobran and Nicholas Lepp (Eds.) Vol. 4,124-125 (2003). (**Best research paper award**).

39. Bhand S.G. and Chaturvedi K.K, ‘Trace elements in benthic diatoms from sediments -a case study of river Narmada, India. In 11th Annual International Conference on Heavy Metals in the Environment (2000) (J. Nriagu, Editor), Contribution #1214. University of Michigan, School of Public Health, Ann Arbor, MI, USA (CD-ROM).

40. Bhand S. G., Kapoor S.i and Chaturvedi K.K., Biogeochemical assessment of trace metals in river sediments, Wenzel, W., D. Adriano, B. Alloway, H. Doner, C. Keller, N. Lepp, M. Mench, R. Naidu and G. Pierzynski (Editors).. *Biogeochemistry of Trace Elements* (2 volumes). Vol 1 pp472-473 1999, Austria.

41. S.G.Bhand and Kamal K Chaturvedi, Vanadium and lead determination in the workplace Environment. In *Heavy Metals in the Environment*. R.D.Wilken, U. Förstner and A. Knöckel (Eds.);Vol. 2: 325-328 (1995) CEP Consultants Ltd. UK

- **Patent Applications Filed/ published/granted**

1. BHAND SUNIL, PAL SOUVIK. **A biosensor kit for detection and analysis of chemical pollutants**, Indian Patent Application No. **3456/MUM/2013** Date of filing: **31 October 2013 (CS filed Oct. 2014)**.
2. (i) BHAND SUNIL, CHANDRA SUDHIR, PANDYA HARDIK, BACHER GAUTAM & KANUNGO LIZY. “Device for Analysis of Mycotoxins” Filed as (a) Indian Patent Application No.1203/MUM/2013 filed on 28 March 2013

(ii) Also filed as **PCT International** Application PCT/IN2014/000176, Publication number WO2014155391 A2, Publication date 2 Oct. 2014 also published as WO2014155391A3.

3. BHAND SUNIL, CHANDRA SUDHIR, PANDYA HARDIK, TIWARI RUCHI, MISHRA RUPESH KUMAR “Analyte Sensor Chips” Filed as;

(i) Indian patent appl. no 933/MUM/2012 "Dt. 29/03/2012, Complete specifications for 933/MUM/2012 filed on 28.03.2013. (Published-The Patent Office Journal 22/11/2013, 29174) Request for examination filed.

(ii) **Australian Innovation patent application** no. **2013100381**, filed on 28 March 2013 based on Indian Patent application no. 933/MUM/2012 dated 29.03.2012. (**Patent Granted and renewed**)

(iii) PCT International Application No. PCT/IN2013/000205, Date of Filing: 28 March 2013. Published as WO 2013/164853 A2 November 07, 2013 also published as WO2013164853 A3 January 09, 2014.  
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(iv) US PATENT APPLICATION No. 14/404,362 filed 26 Nov 2014 subsequent to PCT/IN2013/000205.

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