

CURRICULUM VITAE

NAME Chandran Karunakaran	Date of Birth 05-November-1965		
<i>EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Medical College of Wisconsin, Biophysics, USA	Post-Doctoral	2002-2004	Biosensors
Madurai Kamaraj University, Madurai, India	Ph.D.	2002	EPR Spectroscopy
Saha Institute of Nuclear Physics, Calcutta, India	Post M.Sc.	1989	Bioscience
I.I.T., Madras, Chennai, India	M.Sc.	1988	Chemistry
Madurai Kamaraj University, Madurai, India	B.Sc.	1986	Chemistry

Visiting Faculty/ Scientist

- 1) IOWA STATE UNIVERSITY, AMES, USA (01.11.2015-30.11.2015).
- 2) MEDICAL COLLEGE OF WISCONSIN, MILWAUKEE, USA (13.07.2006-12.07.2009).

POSITIONS

2019- Present	Head & Associate Professor, Biomedical Research Lab, Department of Chemistry, VHNSN College, Virudhunagar-626 001, India.
2009- Present	Associate Professor, Biomedical Research Lab, Department of Chemistry, VHNSN College, Virudhunagar-626 001, India.
2008-2009	Assistant Professor, Medical College of Wisconsin, Department of Biophysics, Milwaukee, Wisconsin, USA.
2006-2008	Research Scientist, Medical College of Wisconsin, Department of Biophysics, Milwaukee, Wisconsin, USA.
2004-2006	Reader, Department of Chemistry, VHNSN College, Virudhunagar-626 001, India
2002-2004	Post-Doctoral Research Fellow, Medical College of Wisconsin, Department of Biophysics, Milwaukee, Wisconsin, USA.
1990-2002	Lecturer, Senior Lecturer, Department of Chemistry, VHNSN College, Virudhunagar-626 001, India.

HONORS/AWARDS

1. **Young Scientist Award-2008** from the Association of Scientists of Indian Origin in America.
2. **Most Cited Paper-2005-2007 Award** Free Radical & Biology Medicine.
 1. UGC-CSIR Joint Research Fellowship-1988
 2. Saha Institute of Nuclear Physics Fellowship-1989
 3. Full Member of International EPR/ESR Society
 3. Full Member of Society of Neuroscience
 4. Life Member of Society for Biological Chemists of India, Biosensor Society, India, Indian Biophysical Society, Indian Academy of Neuroscience
 5. Reviewer of Biosensor and Bioelectronics, Applied Magnetic Resonance, Journal of Molecular Structure, Free Radicals in Biology and Medicine.
 6. Review Editor Frontiers in Oxidant Physiology
 7. Review Editor Sensors and Transducer

AREA OF SPECIALIZATION

Design and development of flexible printed microelectronic circuits using conducting polymers *viz.*, polyaniline, polypyrrole, PEDOT/PSS, functionalized single walled and multiwalled carbon nanotube, graphene, gold functionalized nanoparticles, immunosensors, electronic nose, microbiosensors of various human diseases (including hypoxia, ischemia reperfusion injury, cancer, Parkinson and ALS), and therapeutic markers *viz.*, Cyt *c*, iNOS, synuclein, arginase, etc, cysteine, superoxide radicals, nitric oxide, neurotransmitters, *viz.*, glutamate, dopamine, drugs and its metabolites etc - Development of cost effective virtual electrochemical instrumentation using LabVIEW and hand held microcontroller based electrochemical devices for multiplex biosensing applications, wearable, lab-on-chip, multiplexing assay and immuno & aptasensor applications.

Advanced EPR Spectroscopy *viz.*, low temperature EPR, ENDOR, Pulsed EPR, ESEEM/HYSCORE, ESR spin trapping, multi-frequency EPR, photodynamic therapy, NMR of metalloproteins, computer simulations. *Ex vivo* EPR of Cardiac tissue (Cardiotoxicity during Cancer Chemotherapy), ischemia/reperfusion (inhibition of

oxidative damage by signaling molecule *viz.*, protein kinase A inhibitors), Brain (G93A-ALS mice, METH & MPTP-Parkinson Models and Aged - Role of *m*-aconitase oxidative formation 3Fe4S in Neurotoxicity/Ageing), Breast Cancer (Transferrin in Cancer Metastasis). EPR of mitochondrial Proteins (cytochrome *c* oxidase, cytochrome *c*, Cu, ZnSOD, iron-sulfur clusters).

Books Published

- 1) **C. Karunakaran**, Biosensors and Bioelectronics, Elsevier, 2015.
- 2) **C. Karunakaran**, Spin Resonance Spectroscopy: Principles and Applications in NMR and EPR, **Elsevier**, 2018, New York.
- 3) **Dr. C. Karunakaran** and **Dr. M. Balamurugan**, *Science Chemistry fair Experiments For Colleges And Schools*, V.H.N.S.N. College, Virudhunagar, Tamilnadu, India

Research highlights in Nature India

1. *Sensors to signal cell death*, doi:10.1038/nindia.2013.34; Published online 11 March **2013**.
2. *Biosensor capable of simultaneously detection of nitrate and nitrite ions in human plasma, blood and saliva samples*, doi:10.1038/niindia.2013.144; Published online 28 October **2013**.
3. *Nanotube sensor*, doi:10.1038/nindia.2010.141; Published online 13 October **2010**.

Review articles

1. T. Madasamy, M. Pandiaraj, M. Balamurugan, P. Santharaman, K. Arun Venkatesh, K. Vairamani, A. Robson Benjamin, **C. Karunakaran**, Virtual instrumentation for Electrochemical Biosensor Applications, **Sensor Lett.** 14 (2016) 1-9.
2. M. Pandiaraj, Ajeet Kaushik, **C. Karunakaran**, Shekhar Bhansali, Recent advances in cytochrome *c* biosensing technologies, **Biosens. Bioelectron.** 87 (2017) 654-668
3. S. Rajesh, Charles Kolodziej, **C. Karunakaran**, Clemens Burda, Nanotechnology for Electroanalytical Biosensors of Reactive Oxygen and Nitrogen Species, **Chem. Rec.** 17 (2017) 1-17.
4. M. Balamurugan, P. Santharaman, T. Madasamy, S. Rajesh, N. K. Sethy, B. Kalpana S. Kotamraju, **C. Karunakaran**, Recent trends in electrochemical biosensor of superoxide dismutases, **Biosensors and Bioelectronics.** 116 (2018) 89-99

PEER-REVIEWED PUBLICATIONS

2022

1. M. Dhinesh Kumar, M. Karthikeyan, N. Sharma, V. Raju, J. Vatsalarani, Shasi V Kalivendi, **C. Karunakaran**, Molecular imprinting synthetic receptor based sensor for determination of Parkinson's disease biomarker DJ-1, **Microchemical journal**. 183 (2022), 107959.

2021

1. V. Thamilsri Priya, N. Balasubramanian, V. Shanmugaiah and **C. Karunakaran**, Partially purified lead molecules from *Dodonaea viscosa* and their antimicrobial inhibitory efficacy against infectious human pathogens, **J. of Infection and public health**, 14, (2021), 1822-30.

2020

1. **C. Karunakaran**, M. Karthikeyan, M. Dhinesh Kumar, G. Kaniraja, K. Bhargava, Electrochemical biosensors for point-of-care applications, **Defence Science Journal**. 70 (2020), 549-556.
2. V. Thamilsri Priya, N. Balasubramanian, V. Shanmugaiah and **C. Karunakaran**, phytochemical properties of *Acalypha indica* (L), and its antimicrobial potential against human pathogens **J. Pure Appl. Microbiol.**, 14(1), (2020).
3. V. Thamilsri Priya, N. Balasubramanian, V. Shanmugaiah and **C. Karunakaran**, Evaluation of phytochemical and antibacterial activity of the crude extracts of *senna auriculata* (L), **Internation J. of Pharmaceutical Research**, 12, (2020).

2019

1. K. Parate, **C. Karunakaran**, J. C. Claussen, Electrochemical cotinine sensing with a molecularly imprinted polymer on a graphene platinum nanoparticle modified carbon electrode towards cigarette smoke exposure monitoring, **Sensors & Actuators: B. Chemical**. 287 (2019) 165-172.

2018

1. M. Karthikeyan, R. Rajkumar, M. Dhinesh Kumar, M. Balamurugan, K. Muthukumar, **C. Karunakaran**, Theoretical screening and selection of functional monomers for molecular imprinted electropolymer as sensor for glutamate, **Sensor Lett.** 16 (2018) 590-597.
2. G. Muneeswaran, **C. Karunakaran**, Molecular dynamics simulation approach to explore atomistic molecular mechanism of peroxidase activity of apoptotic cytochrome c mutants, **J. Informatics in Medicine Unlocked**. 11 (2018) 51-60

3. G. Muneeswaran, S. Kartheeswaran, K. Muthukumar, **C. Karunakaran**, Temperature dependent conformational dynamics of cytochrome c: Implications in apoptosis, **J. Molecular Graphics and Modelling**. 79 (2018) 140-148.
4. M. Balamurugan, P. Santharaman, T. Madasamy, S. Rajesh, N. K. Sethy, B. Kalpana S. Kotamraju, **C. Karunakaran**, Recent trends in electrochemical biosensor of superoxide dismutases, **Biosensors and Bioelectronics**. 116 (2018) 89-99

2017

1. P. Santharaman, K. A. Venkatesh, K. Vairamani, A.R. Benjamin, N.K. Sethy, B. Kalpana, **C. Karunakaran**, ARM-microcontroller based portable nitrite electrochemical analyzer using cytochrome c reductase biofunctionalized onto screen printed carbon electrode, **Biosensors and Bioelectronics**, 90, (2017), 410-417. (Impact factor: 7.476)
2. T. Madasamy, M. Pandiaraj, M. Balamurugan, **C. Karunakaran**, Virtual instrumentation for electrochemical biosensor applications, **Sensor Letters**, 15 (1) (2017) 1-10. (Impact factor: 0.5).
3. S. Rajesh, Charles Kolodziej, **C. Karunakaran**, Clemens Burda, Nanotechnology for Electroanalytical Biosensors of Reactive Oxygen and Nitrogen Species, **Chem. Rec.** 17 (2017) 1-17.
4. M. Pandiaraj, Ajeet Kaushik, **C. Karunakaran**, Shekhar Bhansali, Recent advances in cytochrome c biosensing technologies, **Biosens. Bioelectron.** 87 (2017) 654-668.
5. G. Muneeswaran, S. Kartheeswaran, K. Muthukumar, D. Christopher Durairaj, **C. Karunakaran**, Effects of different solvents on the conformations of apoptotic cytochrome c: structural insights from molecular dynamics simulation, **J. Molecular Graphics and Modelling**, 76 (2017) 234-241
6. P. Santharaman, A. Aditya, Chhabra Aastha, N.K. Sethy, B. Kalpana, **C. Karunakaran**, Hemin Conjugated Self Assembled monolayer on Gold Nanoparticles in Polypyrrole Matrix for Nitrite Electrochemical Sensing, **Sensor Lett.** 15 (2017) 1-8.

2016

1. M. Pandiaraj, A. Kaushik, **C. Karunakaran**, S. Bhansali, Recent advances in cytochrome c biosensing technologies, **Biosensors and Bioelectronics**, 87, (2016). (Impact factor: 7.476).
2. P. Santharaman, Mainak Das, Sushil K. Singh, Niroj. K. Sethy, Kalpana Bharagava, Jonathan C. Claussen, **C. Karunakaran**, Label-free electrochemical immunosensors for the rapid and sensitive detection of the oxidative stress marker superoxide

dismutase 1 at the point-of-care, *Sensors and Actuators B: Chemical*, **236**, (2016) **546 - 553**.

3. M. Balamurugan, P. Santharaman, T. Madasamy, J. Claussen, **C. Karunakaran**, A volume miniaturized hydrogen peroxide sensor based on peroxidase activity of copper (II) chlorophyllin on zinc oxide and polypyrrole nanocomposite. *Sensor Lett.* **4**, (2016) 1-8.
4. Suprem Das, Qing He, John A. Hondred, Allison A. Cargill, Shaowei Ding, **C. Karunakaran**, Jonathan C. Claussen, Enabling inkjet printed graphene with post printing thermal annealing to develop a highly sensitive potassium ion selective electrode, *ACS. Appl. Mater Interfaces.* (2017) **9**, 14, 12719-12727

2015

1. M. Balamurugan, T. Madasamy, M. Pandiaraj, B. Kalpana, N.K. Sethy, **C. Karunakaran**, Electrochemical assay for determination of nitric oxide metabolites using copper (II) chlorophyllin modified screen printed electrodes, *Anal. Biochem.*, **478** (2015) 121-127. (*Impact factor: 2.219*).
2. M. Balamurugan, T. Madasamy, M. Pandiaraj, A. Rajendran, **C. Karunakaran**, Electrochemical determination of hydrogen peroxide and bicarbonate using peroxidase activity of copper, zinc superoxide dismutase on carbon nanotube, polypyrrole nanocomposite modified Pt electrode, *Adv. Chem. Lett.* **2** (2015) 24-30.

2014

1. M. Balamurugan, T. Madasamy, M. Pandiaraj, A. Rajendran, **C. Karunakaran**, Electrochemical determination of hydrogen peroxide and bicarbonate using peroxidase activity of copper, zinc superoxide dismutase on carbon nanotube, polypyrrole nanocomposite modified Pt electrode, *Adv. Chem. Lett.*, **1** (2014) 1-7.
2. M. Pandiaraj, A.R. Benjamin, T. Madasamy, K. Vairamani, A. Arya, N.K. Sethy, B. Kalpana, **C. Karunakaran**, A cost-effective volume miniaturized and microcontroller based cytochrome c assay, *Sensors and Actuators A: Physical*, **220** (2014) 290-297.
3. G. Muneeswaran, S. Kartheeswaran, K. Muthukumar, D. Christopher Durairaj, **C. Karunakaran**, Comparative structural and conformational studies on H43R and W32F mutants of copper-zinc superoxide dismutase by molecular dynamics simulation, *Biophysical Chemistry*, **185** (2014) 70-78 (*Impact factor : 2.283*).
4. M. Pandiaraj, N.K. Sethy, B. Kalpana, V.K. Rao, **C. Karunakaran**, Designing label-free electrochemical immunosensors for cytochrome c using nanocomposites functionalized screen printed electrodes, *Biosensors and Bioelectronics*, **54** (2014) 115-121. (*Impact factor : 5.437*).

5. T. Madasamy, M. Pandiaraj, M. Balamurugan, B. Kalpana, N.K. Sethy, **C. Karunakaran**, Copper, zinc superoxide dismutase and nitrate reductase coimmobilized bienzymatic biosensor for the simultaneous determination of nitrite and nitrate, **Biosensors and Bioelectronics**, 52 (2014) 209-215. (*Impact factor* : 5.437).

2013

1. M. Pandiaraj, T. Madasamy, G. Paradesi Naidu, M. Balamurugan, S. Kotamraju, V.K. Rao, B. Kalpna, **C. Karunakaran**, Nanomaterial based biosensors for cytochrome c using cytochrome c reductase, **Bioelectrochemistry**, 91 (2013) 1-7. (*Impact factor*: 3.947).
2. T. Madasamy, M. Pandiaraj, A.K. Koteswararao, S. Rajesh, B. Kalpana, Niroj K. Sethy, K. Srigiridhar, **C. Karunakaran**, Gold nanoparticles with self-assembled cysteine monolayer coupled to nitrate reductase in polypyrrole matrix enhanced nitrate biosensor, **Advanced Chemistry Letters**, 1 (2013) 2-9.
3. **C. Karunakaran et al.** Gold nanoparticles with self-assembled cysteine monolayer coupled to nitrate reductase in polypyrrole matrix enhanced nitrate biosensor, **Adv. Chem. Lett.** 2013, 1, 2-9.
4. Satish Srinivasan, Joseph Spear, **C. Karunakaran**, Joy Joseph, Balaraman Kalyanaraman, Narayan G. Avadhani, Oxidative Stress Induced Mitochondrial Protein Kinase A Mediates Cytochrome C Oxidase Dysfunction, **PLOS** 2013, 8, 10.

2012

1. **C. Karunakaran et al.** Virtual electrochemical nitric oxide analyzer using copper, zinc superoxide dismutase immobilized on carbon nanotubes in polypyrrole matrix, **Talanta** 2012 100, 168-174.
2. S. Prakash, S. Rajesh, S. Rajasingh, **C. Karunakaran**, V. Vasu, Electrochemical incorporation of hemin in a ZnO-PPy nanocomposite on a Pt electrode as NO_x sensor, **Analyst**, 137 (2012) 5874-5880.
3. S. Elango, N. Mathivavan, K. Arun Venkatesh, K. Vairamani, **C. Karunakaran**, T. Madasamy, M. Pandiaraj, Deployment of wireless sensor network for the measurement of exhaled nitric oxide in in-home healthcare, **Sensors & Transducers Journal**, 2012, 142, 87-94.
4. **C. Karunakaran et al.** Theoretical investigations of quinine metabolites of dopamine interaction with DNA – Insights into toxicological effects, **J. Struct. Biol.** 2012, 180, 125-131.
5. **C. Karunakaran et al.** Molecular dynamics simulation studies on structural and conformational changes in tyrosine-67 nitrated cytochrome c, **Molecular Simulation**, 2012, 38, 459-467.

6. V. Ramesh, U.S.E. Arivudainambi, A. Thalavaipandian, **C. Karunakaran**, A. Rajendran, Antibacterial activity of wild Xylaria sp. strain R005 (Ascomycetes) against multidrug-resistant Staphylococcus aureus and Pseudomonas aeruginosa, *Int. J. Med. Mushrooms*. **2012**, 14, 47-53.

2011

1. U.S.E. Arivudainambi, T.D. Anand, V. Shanmugaiah, **C. Karunakaran**, A. Rajendran, Novel bioactive metabolites producing endophytic fungus colletotrichum gloeosporioides against multidrug-resistant staphylococcus aureus, *FEMS Immunol Med Microbiol*. **2011**, 61, 340-345.
2. **C. Karunakaran et al.** Electrochemical sensor for simultaneous measurement of nitrite and superoxide anion radical using superoxide dismutase-mimetic manganese(III) tetrakis(1-methyl-4-pyridyl) porphyrin on polypyrrole matrix, *Sens. Lett.* **2011**, 9, 1682-88.
3. **C. Karunakaran et al.** Electrochemical incorporation of manganese(III) tetrakis(1-methyl-4-pyridyl)porphyrin in ZnO-polypyrrole nanocomposite on Pt electrode as NOx sensor, *Sensor Lett.* **2011**, 9, 1623-1628.
4. **C. Karunakaran et al.** Copper nanoparticles entrapped in SWCNT-PPy nanocomposite on Pt electrode as NOx electrochemical sensor, *Talanta*, **2011**, 85, 964-969.
5. **C. Karunakaran et al.** computational description of cytotoxic potential of lycidamide, an epoxide metabolite of acrylamide, *Comp.Theor.Chem.* **2011**, 964,7-11

2010

1. **C. Karunakaran et al.** Superoxide anion radical biosensor using self-assembled cysteine monolayer on gold nanoparticles in polypyrrole matrix facilitated electron transfer in Cu,ZnSOD, *Sensor Lett.* **2010**, 8, 613-621.
2. **C. Karunakaran et al.** Simultaneous electrochemical determination of superoxide anion radical and nitrite using Cu, ZnSOD immobilized on carbon nanotube in polypyrrole matrix, *Biosens. Bioelectron.* **2010**, 26, 689-695.
3. **C. Karunakaran et al.** Time Dependant Protective Effects of MnTMPyP on Mitochondrial Function and Apoptosis Following Renal Ischemia-Reperfusion Injury, *Free Radic. Res.* **2010**, 44, 773-782.
4. **C. Karunakaran et al.** Electrochemical cysteine biosensor based on the selective oxidase-peroxidase activities of copper, zinc superoxide dismutase, *Sens. Actuators B* **2010**, 148, 17-22.
5. **C. Karunakaran et al.** Oxidation of histidine residues in copper-zinc superoxide dismutase by bicarbonate-stimulated peroxidase and thiol oxidase activities: pulse EPR and NMR studies, *Biochemistry.* **2010**, 49, 10616-10622.
6. G. Anamitra, **C. Karunakaran**, S. Kalivendi, J. Joseph, W.E. Antholine, C.J. Hillard,

A. Kanthasamy, B. Kalyanaraman, Neuroprotection by mitochondria-targeted drug in Parkinson's disease model, *Free Radic. Biol. Med.* **2010**, 49, 1674-1684.

2009

1. C. **Karunakaran et al.** Doxorubicin Inactivates Myocardial Cytochrome *c* Oxidase in Rats: Cardioprotection by Mito-Q, *Biophysical J.* **2009**, 96, 1388-1398.
2. D. Galati, S. Srinivasan, H. Raza, S.K. Prabu, M. Hardy, C. **Karunakaran**, N.G. Avadhani. Role of nuclear encoded subunit V_b in the assembly or stability of cytochrome *c* oxidase complex: Implications in Mitochondrial dysfunction and ROS Production, *Biochem. J.* **2009**, 420, 439-449.
3. S. Rajasingh, S. Prakash, V. Vasu, C. **Karunakaran**, Conformational Flexibility Decreases due to Y67F and F82H Mutations in Cytochrome *c*: Molecular Dynamics Simulations Studies, *J. Mol. Graph. Modell.* **2009**, 28, 270-277.

2005

1. C. **Karunakaran et al.**, Thiol Oxidase Activity of Copper, Zinc Superoxide Dismutase Stimulates Bicarbonate-Dependent Peroxidase Activity *via* Formation of a Carbonate Radical, pp 494 - 500; *Chem. Res. Toxicol.*, **2005**.
2. S. Thomas A. Dhanasekaran, S. Kotamraju, C. **Karunakaran**, S. Kalivendi, J. Joseph, B. Kalyanaraman. Mitochondria superoxide dismutase mimetic inhibits peroxide-induced oxidative damage and apoptosis: role of mitochondrial superoxide, *Free Radic. Biol. Med.* **2005** Sep 1;39(5):567-83.

2004

1. C. **Karunakaran et al.**, Direct probing of copper active site and free radical formed during bicarbonate-dependent peroxidase activity of bovine and human copper, zinc-superoxide dismutases. Low-temperature electron paramagnetic resonance and electron nuclear double resonance studies. *J. Biol. Chem.* **2004** Jul 30;279(31):32534-40.
2. K.K. Mothilal, C. **Karunakaran**, A. Rajendran, R. Murugesan. Synthesis, X-ray crystal structure, antimicrobial activity and photodynamic effects of some thiabendazole complexes. *J. Inorg. Biochem.* **2004** Feb;98(2):322-32.

2003

1. H. Zhang, C. Andrekopoulos, J. Joseph, C. **Karunakaran**, H. Karoui, J.P. Crow, B. Kalyanaraman, Bicarbonate dependent peroxidase activity of human copper, zinc superoxide dismutase induces covalent aggregation of protein-intermediacy of tryptophan-derived oxidation products, *J. Biol. Chem.* **2003**, 278, 24078-24089.

2. K.K. Mothilal, **C. Karunakaran**, P. Sambasiva Rao, R. Murugesan. Single crystal EPR of Cu(II) doped $[\text{Co}(\text{tbz})_2(\text{NO}_3)(\text{H}_2\text{O})]\text{NO}_3$: probe into copper-thiabendazole interaction. *Spectrochim Acta A Mol Biomol Spectrosc.* **2003** Dec; 59(14):3337-45.

2002

1. **C. Karunakaran et al.**, EPR of an exchange-coupled, helical hydrogen-bridged one-dimensional Cu(II) complex containing both octahedral and square pyramidal geometries in the same unit cell. *Mol. Phys.* **2002**, 100, 287.
2. V. Sethuraman, N. Stanley, P. Thomas Muthiah, **C. Karunakaran**, Supramolecular self-assembly *via* inter-ligands hydrogen bonds in $[\text{Cu}(\text{H}_2\text{O})_2(\text{NO}_3)_2(\text{tb})]$ (tb is thiabendazole) *Acta Cryst.* **2002**. E58, m392-m395.

2001

1. **C. Karunakaran et al.**, EPR of Cu(II)-doped seven-coordinate inclusion compounds, $\text{M}(\text{stpy})_3(\text{NO}_3)_2 \cdot 1/2 \text{ stpy}$ (M = Cd(II) and Zn(II) and stpy = *trans*-4-styrylpyridine): Low symmetry effects in admixture of ground states *Spectrochimica Acta A*, **2001**, 57, 441.

2000-1999

1. **C. Karunakaran et al.**, Synthesis, X-ray structure and spectroscopy of a Werner-type host Co(II) complex, *trans*-bisisothiotetrakis(*trans*-4-styrylpyridine)cobalt(II) *J. Mol. Struct.* **2000**, 523, 213.
2. **C. Karunakaran et al.**, Crystal structure and spectroscopy a helical hydrogen-bridged one-dimensional Cu(II) complex containing both octahedral and square pyramidal geometries in the same unit cell *J. Chemical Crystallography* **2000**, 30, 351.
3. **C. Karunakaran et al.**, Synthesis, structure and spectroscopy of clathrate inclusion compounds of cadmium(II), zinc(II), and cobalt(II) *trans*-4-styrylpyridine nitrates as Host with *trans*-4-styrylpyrdine as Guest (2:1) *J. Inclusion Phenom. Macrocyclic Chem.* **2000**, 38, 233.
3. **C. Karunakaran et al.**, X-ray crystal structure and spectroscopy of pseudo-square yramidal Cu(II) complex, *trans*-dinitratotetrakis(*trans*-4-styrylpyridine)copper(II), *J. Chem. Cystallogr.* **1999**, 29, 413.

Selected Papers presented in Conferences/Workshop in abroad

1. **C. Karunakaran**, Synthetic receptor using carbon nanotube integrated molecular imprinted polypyrrole for sensing myoglobin as biomarker of hypoxia. Fourth International Conference on Nanostructured Materials and Nanocomposites (ICNM – 2017) held on 10-12 February 2017 at Mahatma Gandhi University, Kottayam, Kerala.

2. Disposable screen printed carbon electrodes based electrochemical label-free immunosensor for Cu, Zn superoxide dismutase, International Conference on Recent Advances in Research and Treatment of Human Diseases held on **January 9-11, 2015** at Nizam's Institute of Medical Sciences, Hyderabad, India (***Nominated for Young Scientist award***)
3. LabVIEW based electrochemical immunosensor assay for cytochrome *c*, ***National Conference on Chemosensors*** held on **Sep 19-20, 2013** at National Institute of Technology, Trichy, India (***Won best poster presentation award***).
4. Hydrogen peroxide biosensor based on the peroxidase activity of copper, zinc superoxide dismutase, ***National Conference on Chemosensors*** held on **Sep 19-20, 2013** at National Institute of Technology, Trichy, India.
5. Development of LabVIEW- based electrochemical nitric oxide analyzer, ***III National Conference on Advanced Materials*** held on **Jan 23-25, 2013** at PSN College of Engineering and Technology, Tirunelveli, India.
6. Development of electrochemical assay kit for the measurement of nitrite/nitrate using microelectrode immobilized with carbon nanotubes and copper, zinc superoxide dismutase, ***1st National Conference on Micro and Nano Fabrication*** held on **Jan 21-23, 2013** at Central Manufacturing Technology Institute, Bangalore, India.
7. Electrochemical characterization nitrite/O₂ fuel cell using copper chlorophyllin immobilized on zinc oxide polypyrrole nanocomposite, ***National Conference on Chemosensors*** held on **Sept. 19-20, 2013** at National Institute of Technology, Trichy, India.
8. EPR Paramagnetic effects on T2-Weighted MRI of G93A SOD1 Transgenic ALS Mice: Neuroprotection by Mitotempol, ***International Society for Magnetic Resonance for Medicine***, ISMRM-2009, Hawaii, USA
9. Iron-Sulfur Cluster Oxidative Damage causes increased susceptibility to MPTP and METH-Induced Neurotoxicity in Aged Mice Brain, ***International Society for Neurochemistry***, Busan, South Korea, August 23-28, 2009.
10. Neuroprotective effects of Mitochondria-targeted antioxidants against MPTP-induced oxidative damage in mitochondrial aconitase in a preclinical animal model of Parkinson's Disease, Washington, DC, Nov. 15-19, ***Neuroscience***, 2008.
11. Oxidative Modifications and Characterization of Histidine-Rich Cu,ZnSOD During its Bicarbonate-stimulated Thiol Oxidase and Peroxidase Activities: ***ENDOR, Pulsed EPR and NMR Studies, Biophysical Society Meeting*** Feb, 2-6, 2008, Long Beach, California.
12. *Ex Vivo EPR Evidence of Inactivation of Myocardial Cytochrome c Oxidase in Rats treated with Doxorubicin: Implications in Cardiotoxicity, A Joint Conference of the*

12th In Vivo EPR Spectroscopy & Imaging and the 9th International EPR Spin Trapping / Spin Labeling, Chicago, IL, USA, April 29-May 3, 2007, p-45.

13. *Mitochondria-Targeted Nitroxide, Mitoproxyl, Inhibits Peroxide-Induced Oxidative Damage and Apoptosis in Endothelial Cells*. **Society for Free Radical Biology and Medicine (SFRBM), 2004- S124**, Volume 37, Supplement 1, Page, 13.
14. *Thiol Oxidase Activity of Copper, Zinc Superoxide Dismutase Stimulates Bicarbonate-Dependent Peroxidase Activity via Formation of a Carbonate Radical*, **Society for Free Radical Biology and Medicine**, 10th Annual Meeting. November 20-24, 2003. Seattle, Washington, USA.
15. *EPR and ENDOR Studies on the Effect of Bicarbonate on Copper Site and Free Radical Formation in WT and W32F Human and Bovine Copper, Zinc Superoxide Dismutase*, **26th International EPR Symposium** July 27-31, 2003, Hyatt Regency Denver, Denver, Colorado, USA.

Papers presented in Conferences/Workshop organized by DIPAS-DRDO

1. Electrochemical assay for the determination of nitric oxide, nitrite and nitrate using copper, zinc superoxide dismutase and its mimic copper(II) chlorophyllin modified screen printed carbon electrodes. **Global Hypoxia Summit & 4th International Conference on Chronic Hypoxia** held on **Aug 09-12, 2012** at DIPAS-DRDO, New Delhi. India.
2. Screen printed carbon electrodes functionalized with cytochrome c reductase and carbon nanotubes for sensitive determination of cytochrome c. **Global Hypoxia Summit & 4th International Conference on Chronic Hypoxia** held on **Aug 09-12, 2012** at DIPAS-DRDO, New Delhi. India.
3. Copper-zinc superoxide dismutase and nitrate reductase coimmobilized bienzymatic electrode for the simultaneous determination of nitrite and nitrate. **Global Hypoxia Summit & 4th International Conference on Chronic Hypoxia** held on **Aug 09-12, 2012** at DIPAS-DRDO, New Delhi. India.
4. LabVIEW-based highly sensitive and cost effective nitric oxide analyzer using Cu,Zn SOD immobilized on carbon nanotubes in polypyrrole matrix. **International Symposium on recent trends in Neurosciences** held on **Oct 30-Nov 02, 2011** at DIPAS-DRDO, New Delhi. India.

Selected Papers presented in Conferences/Workshop in India

1. *Design and development of a new cytochrome c reductase based biosensor for the measurement of apoptosis*. **Annual meeting of the Indian Biophysical Society (IBS-2012) on Jan 19-21, 2012** at Chennai, India.

2. *Effect of H43R and W32F mutations in Copper, Zinc Superoxide dismutase on structural-dynamic behavior: Role in Amyotrophic Lateral Sclerosis Disease. Annual Meeting of the Indian Biophysical Society (IBS-2012) on Jan 19-21, 2012 at Chennai, India.*
3. *Molecular dynamics simulation studies on structural and conformational changes in Tyrosine nitrated horse heart cytochrome c. Annual meeting of the Indian Biophysical Society (IBS-2012) on Jan 19-21, 2012 at Chennai, India.*
4. *Cytochrome c biosensor using Cytochrome c reductase linked to self-assembled monolayer on Gold nanoparticles in Polypyrrole matrix. World Congress on Biotechnology on Mar 21-23, 2011 at Hyderabad, India.*
5. *Gold nanoparticles with self-assembled Cysteine monolayer coupled to Nitrate reductase in Polypyrrole matrix enhanced Nitrate biosensor. World Congress on Biotechnology on Mar 21-23, 2011 at Hyderabad, India.*
6. *Electrochemical determination of nitrite using Copper(II) chlorophyllin complexed to Zinc oxide nanoparticles in Polypyrrole matrix. World Congress on Biotechnology on Mar 21-23, 2011 at Hyderabad, India.*
7. *Self-Assembled Cysteine Monolayer on Gold Nanoparticles in Polypyrrole Matrix Facilitated Electron Transfer in Cu,ZnSOD based Superoxide Anion Radical Biosensor. International Conference on Advances in Free Radicals Research, Natural Products, Antioxidants and Radioprotectors in Health & Ninth Annual Meeting of the Society of Free Radical Research – India on JAN 13-15, 2010 at Hyderabad. India.*
8. *Carbon Nanotubes enhanced Cu,ZnSOD Immobilization in Polypyrrole-Platinum Electrode and Sensitivity for the Determination of Superoxide Anion Radical. International Conference on Advances in Free Radicals Research, Natural Products, Antioxidants and Radioprotectors in Health & Ninth Annual Meeting of the Society of Free Radical Research – India on JAN 13-15, 2010 at Hyderabad. India.*
9. *Amperometric Cysteine Biosensor Based on the Selective Oxidase-Peroxidase Activities of Copper, Zinc Superoxide Dismutase. International Symposium on Advance Neurosciences and XXVI Annual Conference of Indian Academy of Neurosciences. Theme: Recent advances in neurosciences and cellular basis of brain function and disorders on Dec 12-14, 2008 at Cochin. India- Annals of Neurosciences, Volume 15, 2008, Page No. 96.*
10. *Cysteine Assay Based on Oxidase-Peroxidase activities of Copper, Zinc Superoxide Dismutase: EPR Spin trapping, Optical and Fluorometric methods. International update on Basic and Clinical Neuroscience Advances and XXIV Annual Conference of Indian Academy of Neurosciences. Theme: Unraveling Mysteries of the Brain on December 17-20, 2006 at Lucknow, India- Annals of Neurosciences, Volume 13, 2006, Page No. 94.*

11. *EPR studies of a novel square pyramidal Cu(II) complex, [Cu(C₁₃H₁₁N)₄(ONO₂)](NO₃)*, Workshop on Industrial applications of NMR spectroscopy and 3rd **National Symposium on Magnetic Resonance**, IIT, New Delhi, India, 1997, p 30.
12. *Synthetic receptor based molecularly polypyrrole imprinted sensor for determination of Parkinson's disease biomarker DJ-1*. **8th Annual conference- International conference on Advances in Chemical Biology and Biologics (ICBS-2019) held on 02-04 Nov 2019 at CSIR-IICT Hyderabad.**
13. *Molecularly polypyrrole imprinted as synthetic antibody based sensor for sensitive and selective detection of SOD1 as neuronal disease marker*. **10th International Conference on Emerging Advancement of Science & Technology Conclave (IC EAST– 2019) held on 05-06 SEP 2019 at New Delhi.**
14. *Computational designing of molecular imprinted electropolymers as synthetic receptors for Parkinson's disease biomarker DJ-1 protein*. **1st International Conference on Sustainable Development in Energy & Environment (ICSDEE) held on 18-20 July at Department of Bio-Technology Kamaraj College of Engineering and Technology, Virudhunagar.**
15. *ONIOM2 DFT/PM6 free energy of binding and chiral recognition studies of R and S noradrenaline towards β-cyclodextrin*. **10th International Conference on Emerging Advancement of Science & Technology Conclave (IC EAST– 2019) held on 05-06 SEP 2019 at New Delhi.**
16. *Electrochemical biosensor for point-of- care applications*. **10th International Conference on Emerging Advancement of Science & Technology Conclave (IC EAST– 2019) held on 05-06 SEP 2019 at New Delhi. (Invited talk)**

Workshops Organized

Interdisciplinary Workshop on “**Biosensors and their applications**” Under the aegis of Defence Institute of Physiology and Allied Sciences (DIPAS) Defence Research Development Organization (DRDO) –New Delhi on 20th Dec 2010.

Book chapter contributed

1. M. Pandiaraj, K. Vairamani, R.A. Benjamin, **C. Karunakaran, 2016**, Chapter IV- Integrated electronics, Analytical Transducers and Signal Processing for sensor development. *Nanobiotechnology for sensing applications From Lab to Field*, Apple Academic Press Publishers, CRC Press, Taylor & Francis Group.
2. **C. Karunakaran**, R. Rajkumar, B. Kalpana, **2015** Introduction to Biosensors Karunakaran C, Kalpana B, R. Benjamin (Eds.,) **Biosensor and Bioelectronics**, 1-66,

ELSEVIER.

3. **C. Karunakaran**, P. Santharaman, Mainak Das, **2015** Nanocomposite Matrix Functionalization for Biosensors Karunakaran C, Kalpana B, R. Benjamin (Eds.,) **Biosensor and Bioelectronics**, 69-128, **ELSEVIER**.
4. **C. Karunakaran**, T. Madasamy, N.K.Sethy, **2015** Enzymatic Biosensors Karunakaran C, Kalpana B, R. Benjamin (Eds.,) **Biosensor and Bioelectronics**, 133-196, **ELSEVIER**.
5. **C. Karunakaran**, M. Pandiaraj, P. Santharaman, **2015** Immunosensors Karunakaran C, Kalpana B, R. Benjamin (Eds.,) **Biosensor and Bioelectronics**, 205-243, **ELSEVIER**.
6. K. Arun Venkatesh, R. Benjamin, **C. Karunakaran**, S. Elango, **2015** Instrumentation Karunakaran C, Kalpana B, R. Benjamin (Eds.,) **Biosensor and Bioelectronics**, 247-315, **ELSEVIER**.
7. **C. Karunakaran**, T. Madasamy, M. Pandiaraj, **2014**, Electrochemical biosensors for hypoxia biomarkers, *Translational Research in Environmental and Occupational Stress*, Springer.
8. **C. Karunakaran**, M. Pandiaraj, T. Madasamy, **2013**, Chapter 4 - Nanocomposites using polypyrrole and nanotubes/nanoparticles enhanced biosensors for oxidative stress biomarkers, *Handbook of functional nanomaterials*, Vol. 3, Application and development, Nova Science Publishers, INC. New York, USA.

Patent Applied

1. Electrochemical immunosensors for Copper, zinc superoxide dismutases (SOD1) (*Indian Patent filed, Application No. # 3886/CHE/2015 dt. 29-07-2015*). Application published
2. Neurodegenerative disease biomarker proteins specific synthetic receptor based functional molecular imprinted polymers (**Application No: 202141013005 dt. 25/03/2021**), **Patent No: 10986**. Application published

Patent Granted

1. Electrochemical cysteine biosensor based on the selective oxidase-peroxidase activities of copper, zinc superoxide dismutase (*DBT-India Patent filed, Application No. # 591/DEL/2009 dt. 26-03-2009*), **Granted application (30.04.2019)**. **Patent No: 312051**.

2. Strip for measuring oxides of nitrogen (*India Patent filed/2108/DEL/2014 dt. 24-07-2014*) Joint patent with DRDO-DIPAS, Delhi. **Granted application (16.03.2020). Patent No: 334785.**

Plenary/guest/invited lecture delivered:

Programme	Place	Date	Talk
DBT - Short Term Training Course (STTC) on "Recent Trends in Thin Film Development and their Applications in Biomedical and Biosensor Devices"	Sathyabama Institute of science and technology, Chennai	12-28/Mar/2018	Biosensor for Point of care applications
National Workshop on recent development in sensor technologies	Bharathiar University, Coimbatore	07-08/Jan/2019	(Invited Lecture) Development Biosensor for our military defence personnel at highly altitude
International Conference on Sustainable Development in Energy & Environment at Kamaraj College of Engineering & Technology	Kamaraj College of Engineering & Technology, Virudhunagar	18-20/July/2019	(Plenary Lecture) Development Biosensor for Point of care applications
State Level Seminar Frontier areas in chemistry	The Madura College, Mudurai	28/July/2019	Inderdisciplinary research in chemistry & Biosensor and its Applications
Guest Lecture programme	ANJA College, Sivakasi	21/Sep/2019	Electrochemical Biosensor and Their Applications
International Conference on Emerging Advancement Science and Technology and 10 th India-Japan Science & Technology Conclave	New Delhi	05-06/Sep/2019	(Invited talk) Emerging Science and technologies
Invited Lecture	CSIR-IICT, Hyderabad	02-04/Nov/2019	Biosensor and Their Applications
Guest Lecture programme	SFR College, Sivakasi	18/Dec/2019	Guest Lecture

Webinar Lecture Programme	The Madura College, Mudurai	15/07/2020	Molecular Docking & Drug Designing
Webinar Lecture Programme	The Madura College, Mudurai	15/07/2020	Emerging Trends in Bio-physical Chemistry
Webinar Lecture Programme	Government Arts College for women, Krishnagiri	09/06/2020	Nanomaterial - based Biosensors for Biochemical Applications
Webinar Lecture Programme	G.Venkataswamy Naidu College, Kovilpatti	18/06/2020	Electrochemical Biosensors: Emerging Trends and Applications
Webinar Lecture Programme	The Madura College, Mudurai	28/06/2020	One Day Preparatory Course for Chemistry Competitive exams
Webinar Lecture Programme	Government Arts College for women, Krishnagiri	01/07/2020	Principles of NMR/ESR Problems and Applications
Webinar Lecture Programme	Nallamuthu Gounder Mahalingam College, Pollachi	07/07/2020	Selected Topics in Chemical Sciences for CSIR-NET/SET/GATE/IIT-JAM Aspirants
Webinar Lecture Programme	Madurai Kamaraj University	01/12/2020	Immunobiosensor for point-of-care medical applications

Conference/seminar/programme organised:

Programme	Place	Date	Title / Talk
Orientation to Parents-Students	VHNSN College, Virudhunagar	09/10/2019	Importance of Higher Education
Virudhunagar District cluster college	VHNSN College, Virudhunagar	05/10/2019	Training workshop on spectral measurement/ Analysis
UG/PG Chemistry Association	VHNSN College, Virudhunagar	11/03/2020	Intracollegiate Chem Fest – 2020
UGC-Guest Lecture	VHNSN College, Virudhunagar	17/12/2019	Solving organic chemistry GATE/CSIR-NET questions
UGC-Guest Lecture	VHNSN College, Virudhunagar	07/12/2019	Critical analysis of GATE/CSIR-NET

			questions
National seminar	VHNSN College, Virudhunagar	22/08/2019	Recent Advances in Chemical Research
Guest Lecture	VHNSN College, Virudhunagar	26/02/2021	Workshop on Molecular Modelling/Drug Deigning and Discovery
Guest Lecture	VHNSN College, Virudhunagar	12/03/2021	Workshop on Labview based virtual instrumentation for sensor application

Ongoing/completed major research projects

Name of Agency	Title of project	Total Amount Sanctioned	Period of support	Completed/ on-going
SERB-DST	Synthetic functional molecular imprinted organic biomimetic receptors for selective biomarkers of neurodegenerative diseases. Ref. No. EMR/2016/007454 dated 12.09.2018	26.13 Lakhs	2018-2021	on-going
NIH, USA	Neuroprotection by mitochondrial targeted antioxidants	\$ 2.7 Million	2009-2014	Completed
DRDO, New Delhi	Design and development of microcontroller based hand-held biosensor device for the measurement of nitric oxide metabolites (TC/370/TASK-191(CK)/DIPAS/2013)	9.90 Lakhs	2013-2014	Completed
DRDO, New Delhi	Electrochemical Immunosensor Assay for cytochrome <i>c</i> as Biomarker of Apoptosis(ERIP/ER/1104603/M/01/1400)	9.78 Lakhs	2012-2014	Completed
DBT, New Delhi	Development of functionalized nanoparticles based biosensor for cytochrome <i>c</i> using cytochrome <i>c</i> reductase: Biomarker of apoptosis (BT / PR13579 / NNT / 28 / 473 /2010)	32.95 Lakhs	2010-2013	Completed
UGC, New Delhi	Force Field parameterization of oxidized aminoacids for studying the structure/dynamics of oxidatively modified proteins(39-690/2010(SR))	4.36 Lakhs	2011-2014	Completed
DRDO, New Delhi	Development of functionalized nanoparticles-based biosensor for simultaneous measurement of nitrite and superoxide anion radical. (TC / 341 / Task-165(CKK) / DIPAS / 2010)	9.35 Lakhs	2010-2011	Completed
DBT, New Delhi	Cu,ZnSOD and its mutant induced Cysteine Cytotoxicity and its prevention: Implications in Neuronal diseases (BT / PR6153 / MED / 14 / 748 / 2005)	21.09 Lakhs	2006-2008	Completed

Ph.D scholars completed and doing

S. No	Name of the Candidate	Title of the Thesis	Year of Award
1.	Dr.S.Rajesh	<i>Design and Development of Biosensor</i> , (Research Associate, University of Wisconsin, Madison, USA), Scientist (Research & development) CARI Therapeutics c/o Lab Fellows, USA	2011
2.	Dr.U.S.E. Arivudainambi (F8054)	<i>Studies on bioactive natural products from endophytic fungi</i> , Manager R&D Drilling Chemicals, Dubai	2012

3.	Dr.S.Prakash	<i>Metalloporphyrins and Nanoparticles based NOx sensors</i> , Assistant Professor in Physics, VHNSN College, Virudhunagar	2012
4.	Dr.S.Rajasingh	<i>Computational studies on mutant and modified cytochrome c/DNA</i> , Head (retired), Department of Physics, VHNSN College, Virudhunagar	2013
5.	Dr.P.Gurusamy	<i>Theoretical studies on structurally and chemically modified biomolecules</i> , Head (retired), Associate Prof.in Chemistry, SRNM College, Sattur	2013
6.	Dr.V.Ramesh (F8302)	<i>Studies on antimicrobial potential of some selected macro fungi</i> , Assistant Professor in Botany Vivekananda College, Madurai	2013
7.	Dr.M.Pandiaraj (F8591)	<i>Development of electrochemical biosensors / immunosensors for cytochrome c</i> PDF-Florida International University, USA, Scientist, CSIR-Central Electrochemical Research Institute, Karaikudi	2014
8.	Dr.T.Madasamy (F8592)	<i>Development of nanoparticles based biosensors</i> PDF-Swiss Federal Institute, University College London-UK	2014
9.	Dr.G.Muneeswaran (F8733)	<i>Studies on Macromolecules</i> , Post-Doctoral Research Associate, Taxes Tech University, USA, Research Associate, Centre for Molecular Modeling, CSIR-IICT, HYD	2015
10.	Dr.M.Balamurugan (F8601)	<i>Studies on enzymes and their mimetics Biosensor</i>	2017
11.	Dr.P.Santharaman (F8983)	<i>Studies on electrochemical immunosensors and biosensors</i> , Assistant Professor, GVN College, Kovilpatti	2017
12.	V.Tamil Priya (F9904)	<i>Studies on potential bioactive molecule purification and characterization from the medicinal and characterization antimicrobial activity</i>	Doing
13.	M.Karthikeyan (F10218)	<i>Studies on cyclodextrins and conducting polymer based neuronal markers sensors</i>	Doing
14.	M.Dhinesh Kumar (F10219)	<i>Studies on functional molecularly imprinted polymer based sensor</i>	Doing