PROJECT COMPLETION REPORT FOR RPS PROGRAMMES

File No.: 8023/BOR/RID/RPS/39/2008-09

Date of Sanction: 06.01.2009

Subject area: Biomedical Instrumentation.

1. Principal investigator (Name and address)

Dr. Panchanan Puzari,
Assistant Professor,
Department of Chemical Sciences,
Tezpur University.

2. Project title: Electro-immobilization of acetylcholinesterase system for sensor Application.

3. Total Cost of the project: 17.35 Lakhs

4. Date of commencement of the project : 16th March 2009

5. Duration of the project: 2 years

6. Date of completion: 16th March 2012

7. Objective of the project: To develop a process for stable immobilization of Acetyl cholinesterase in conducting polymers so as to pave the way for construction of a long lasting, reusable biosensor for cholinesterase inhibitors.

8. Salient Research Achievements:

8.1. New findings/ Achievements/IPR Potential: We have developed a novel immobilization method for the enzyme Acetylcholine esterase inside conducting polymer matrix on platinum electrode support. This was then applied as a biosensor probe for detection and quantification of organophosphate and organocarbamate pesticides. Paraoxon, a typical organophosphate pesticide could be detected down to 1.1 ppb level and carbofuran, a typical organocarbamate could be detected down to 0.12 ppb level. The stability of the sensor probe was up to 4 months and operational stability up to eight consecutive measurements while detecting the pesticides.
The work has significant IPR Potential. It was attempted to file a Patent application against the invention through TIFAC of DST (as per the procedure followed by the University IPR cell). TIFAC has accepted the proposal after necessary patent search.

The application could not be processed further due to not obtaining an NOC from AICTE.

8.2. Product/Process Developed: As explained above (Para 8.1)

8.3. Patent(s) applied for/Taken, if any: As explained above (Para 8.1)

8.4. B.Tech Project/M. Tech Thesis/ Ph.D., if any: Nil

8.5. Consultancy: Nil

9. Conclusions and scope for future work:

The goal/objective of the project has been met more than 80%. The remaining 20% could not be achieved due to time constraint.

The objective of the project was to see the feasibility of using the conducting polymers as the immobilization matrix for future designing of miniaturized pesticide biosensors. We have demonstrated that polypyrrole can be efficiently used for construction of such biosensors. The other conducting polymers Polyaniline, polythiophene etc. could not be tested due to time constraint. We have developed a novel method of immobilization of the bioreceptor acetyl cholinesterase in polypyrrole using a novel bio component gelatin as the stabilizer in conjunction with gluteraldehyde as cross linker. The sensor probe thus obtained worked very efficiently in spiked pesticide solutions in phosphate buffer and 5% acetonitrile.
The work can be extended further to (1) Add some modifications so as to make it compatible to organic solvents, so that it can be applied to analyze real field samples extracted in organic solvents other than acetonitrile, (2) design a resistomeric sensor system for discriminations among various cholinesterase inhibitors/pesticides in gaseous state.

10. List of publications arising from the project grant:

1. R.R.Dutta and P. Puzari, Amperometric biosensing of organophosphate and organocarbamate pesticides utilizing polypyrrole entrapped acetylcholinesterase electrode, *Biosensors and Bioelectronics*, 52 (2014) 166-172.

30/12/13
(Pancharan Puzari)

Dated: 30/12/13 Principal Investigator

Registrar/Director/Principal

(Signature & seal)

Registrar
Tezpur University
Napaam, Tezpur

AUDITED UTILIZATION CERTIFICATE

Certified that out of Rs. 17,35,000/- of grant-in-aid sanctioned during the year 2008-09 Letter No. F.No. 8023/BOR/RID/RPS-39/2008-09, Rs. 16,13,456/-has been utilized for the purpose of procuring equipment and consumables for which it was sanctioned and the balance of Rs. 1,21,544/- remaining unutilized at the end of the year has been surrendered to All India Council of Technical Education (vide draft No. 456993, (2000, 205, 16) ..... dated ...25/11/11.....).

Certified that the grant has been utilized as per laid down terms and conditions for which it was sanctioned.

24/10/11

Finance Officer,
Tezpur University

25/10/11

Registrar
Tezpur University

Dated:

Chartered Accountant

P. L.
20/10/11