

# DM-ISEAC-2011

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*Fourth ISEAC  
International Discussion Meet  
on  
Electrochemistry and its Applications*

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*February 7–10, 2011*

Mascot Hotel, Thiruvananthapuram,  
Kerala, INDIA

*Editors*

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## **Indian Society for ElectroAnalytical Chemistry**

*Reg. No. MAH/MUM/1173/2006 GBBSD*

*(Website : [www.iseac.org](http://www.iseac.org))*

During the Workshop cum Seminar on Electroanalytical Chemistry and Allied Topics (ELAC-2000) organized from November 27 to December 1, 2000 at Bhabha Atomic Research Centre, Mumbai, various participants expressed a need to have a forum with focus on the advancement of electroanalytical techniques and their applications in various disciplines. Similar opinion was expressed by others who were not able to participate in ELAC-2000. This motivated the organizers of ELAC-2000 to launch a Society with a focus on Electroanalytical Chemistry. Subsequently, the Indian Society for Electroanalytical Chemistry (ISEAC) was launched on October 1, 2003 during a meeting held at Fuel Chemistry Division (FCD), Bhabha Atomic Research Centre (BARC), Trombay, Mumbai.

The Society was launched with the objective of providing a common platform to all electroanalytical scientists working in the country in various Universities/Institutes/Industries and promote the growth of electroanalytical research in the country.

At present, there are 127 life-members of ISEAC from within India and Overseas.

### ***Objectives of ISEAC :***

- To promote the growth of various techniques of Electroanalytical Chemistry used in various disciplines, e.g. chemistry, physics, material science, biology, environment, etc.

- To provide a common platform to the young researchers as well as to the scientists using electroanalytical chemistry for research in their respective disciplines.
- To disseminate information to all the electroanalytical scientists in the country about the activities of similar other professional bodies, e.g. European Society for Electroanalytical Chemistry (ESEAC), American Society for Electroanalytical Chemistry (SEAC), International Society of Electrochemistry (ISE).
- To work in harmony with other Electrochemical Societies in the country, e.g. Society for the Advancement of Electrochemical Science and Technology (SAEST), Electrochemical Society of India (ECSI) keeping in mind the focus of ISEAC.
- To provide incentive by way of awards to researchers for best thesis, best paper published in the journal and best paper presented in National and International Conferences / Symposia.
- To bring out and update periodically a directory of Life-Members of ISEAC with contact information and recent publications in the area of Electrochemistry of each individual.
- To encourage young as well as experienced Indian researchers for participation in International Electrochemistry Conferences by providing partial funds.

### ***International Conferences organized by ISEAC :***

ISEAC organizes International Conferences, Discussion Meets and Workshop cum Symposium on Electrochemistry and allied topics with the co-sponsorship of Departments of Government of India, International Society of Electrochemistry and other Scientific Organizations and Industries. Four Triennial International Conferences ELAC-2000 at Mumbai, ELAC-2004 at Goa, ELAC-2007 at Shimla and ELAC-2010 at Puri were organized under the auspices of ISEAC, in addition to three Discussion Meets (DM-COUL-2005 at Mumbai, DM-BNFL-2006 at Mumbai and DM-ELANTE-2008 at Munnar).

## ***ISEAC Awards :***

### *ISEAC Eminent Scientist Awards*

ISEAC recognizes three Scientists/Technologists as "*ISEAC Eminent Scientist*" in each of the Triennial International Conference on ElectroAnalytical Chemistry (ELAC) organized by ISEAC. The award consists of cash prize of Rs. 10,000/- and a citation. ISEAC invites all the researcher in India to send complete biodata, photograph, list of important journal publications in the area of electrochemistry (last 5 years), visits abroad (last 5 years), number of Ph. D / M. Sc. Students guided, national and international collaborations (if any), other awards received, names, addresses and email IDs of two referees from within India and/or overseas and two page summary of the work performed to ISEAC Secretariat. The nominee must be a life-member of ISEAC. Self-nominations are also welcome.

### *ISEAC Journal Publications Awards*

ISEAC recognizes nine excellent publications for "*ISEAC Journal Publications Awards*" published in Peer Reviewed Journals by Indian Scientists based on the work done in India. These awards are given during each Triennial International Conference on ElectroAnalytical Chemistry (ELAC) organized by ISEAC. The nine awards consist of three awards for each year in between the triennial ELAC conferences. The award consists of a cash prize of Rs. 2000/- and a merit certificate. All the award winning papers are displayed during ELAC Conference. One of the authors should be ISEAC life-member to qualify for award.

### *Individual Conference Awards*

During Conferences as well as Discussion Meets organized by ISEAC, all the research scholars' presentations and poster presentations are evaluated by a panel of judges for cash awards and merit certificates. A minimum of three awards to the best posters and one award to oral presentations by research scholars are given in the ISEAC Conference/Discussion Meets. The award consists of a cash prize of Rs.1,000/- and a merit certificate. The student receiving Best Research Scholar Presentation in every event organized by ISEAC is provided with free registration, travel assistance (within India),

lodging and boarding for attending the next ISEAC Conference/Discussion Meet, provided he/she has a presentation/contribution.

The names of the ISEAC award winners are available on the ISEAC website.

### ***Procedure to join ISEAC***

Download the 'Membership Form' from the menu "Join ISEAC as a Member" available at the ISEAC web site at the address: **<http://www.iseac.org>**. Fill the form and send it along with a colour passport size photograph and a cheque or demand draft in favour of "ISEAC, Mumbai" to the following address :

Mr. Saurav K. Guin, Secretary, ISEAC, C/o Fuel Chemistry Division, BARC, MUMBAI 400 085, INDIA.

The membership fee can also be transferred electronically to ISEAC account. The details of Direct Electronic Transfer of Money to ISEAC account is given below:

<b>Name of the Bank</b>	State Bank of India, BARC Branch, Branch Code 1268, Trombay, Mumbai-400 085, India.
<b>Beneficiary</b>	Indian Society for ElectroAnalytical Chemistry (ISEAC)
<b>Account No.</b>	10536132966
<b>BIC (Swift Code)</b>	SBININBB 508
<b>IFSC Code (For NEFT)</b>	SBIN0001268

### ***Please note***

The Life-membership fee w.e.f. April 1, 2004 is Rs. 2000/- (Rs. Two thousands only) for Indians to be paid by a local cheque / cash / DD and for others € 200/- (Euro two hundred only). Please add Rs. 100/- for outstation cheque (i.e. other than Mumbai).



## International Society of Electrochemistry

associated organization of IUPAC

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Dear Colleague,

I am delighted that you are taking part in an ISE-sponsored meeting and have the opportunity to benefit from interactions with a number of ISE members and the Society. Besides sponsoring scientific meetings of interest to the electrochemical community, the ISE organizes its own Annual Meetings and Spring Meetings, publishes its journal *Electrochimica Acta* and offers ISE prizes to promising young researchers and distinguished scientists.

**We are very pleased to invite you to become a member of the International Society of Electrochemistry.**

There are many reasons for joining the International Society of Electrochemistry. ISE members can obtain:

- reduced subscription rates for *Electrochimica Acta* and for several other important journals: *Journal of Electroanalytical Chemistry*, *Electrochemistry Communications*, *Bioelectrochemistry*, *Corrosion Science*, *Journal of Power Sources*, *Journal of Applied Electrochemistry*, *Electroanalysis*, and *Journal of Solid State Electrochemistry*;
- reduced registration fees for ISE Meetings;
- regular updates and announcements on ISE and other activities of interest;
- increased interactions with electrochemists in your own and neighboring regions;
- access to the "members restricted area" of the ISE website;
- access to the full membership directory which contains the addresses of all ISE members;
- support from the Millennium Fund and Presidential Fund;

Furthermore, young members may apply for the *Electrochimica Acta* Travel Award for Young Electrochemists and ISE Travel Award for Young Electrochemists to attend the ISE Annual Meeting.

ISE members participate fully in the Society's activities which are aimed at advancing electrochemical science and technology, disseminating scientific and technological knowledge, promoting international cooperation in electrochemistry, and maintaining a high professional standard among its members.

Becoming an ISE member is simple: All you have to do is fill in the Membership Application Form found in the Society web site, at the address: [http://members.ise-online.org/members/new\\_members.php](http://members.ise-online.org/members/new_members.php), and submit it on-line. Should you have difficulties in finding two sponsoring ISE members, please write to the Executive Secretary of the Society Dr. M. Musiani, e-mail: [m.musiani@ieni.cnr.it](mailto:m.musiani@ieni.cnr.it). The membership fee for the calendar year 2011 is 40 Euro (10 Euro for age below 30). Once your application is accepted, the ISE Office will contact you for the payment of the membership dues.

Sincerely,

Prof. Mark E. Orazem  
President of ISE



# *DM-ISEAC-2011*

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## Preface

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*Electrochemistry plays a dominant role in a vast number of research and applied areas. One of the most important developments over the last few decades has been the spread of electrochemical concepts into different areas of research and development. In fact, rather than electrochemistry being considered as a branch of chemistry, its footprints can be seen in a variety of fields for both methodological applications and fundamental studies. The present Discussion Meet on Electrochemistry and its Applications (DM-ISEAC-2011) aims to provide an up-to-date electrochemical source for engineers and scientists, as well as for students needing a starting point in their search for reliable information. It focuses at exposing the participants to new developments in electroanalytical techniques and innumerable applications of electrochemistry in different areas.*

*It is indeed a matter of great pleasure and satisfaction to the Editors to present this Volume containing manuscripts of the Invited Talks, the Contributed papers and the Research Scholars' oral presentations to be discussed during the Discussion Meet (DM-ISEAC-2011) on Electrochemistry and its Applications to be held at Mascot Hotel, Thiruvananthapuram, Kerala, India, during February 7-10, 2011. The present Discussion Meet is being organized under the aegis of Indian Society for ElectroAnalytical Chemistry (ISEAC), Mumbai and is the Fourth in the Series. Previously, three Discussion Meets DM-COUL-2005, DM-BNFL-2006 and DM-ELANTE-2008 have been organized under the auspices of ISEAC, in addition to four Triennial International Conferences ELAC-2000 at Mumbai, ELAC-2004 at Goa, ELAC-2007 at Shimla and ELAC-2010 at Puri. In the present Discussion Meet, there are about 20 Invited Talks, 3 Short Lectures, 23 Contributed Papers, 10 Research Scholars' oral presentations and 3 Tutorial Talks. In addition, the program would include open forum discussion on electrochemistry and its Applications. About 100 delegates from different Institutes, Universities and Industries in India, including a few invited speakers from overseas would participate in the present Discussion Meet.*

*The Editors are thankful to Dr R.K Sinha, Director, Bhabha Atomic Research Centre, Trombay, Mumbai for supporting different activities of ISEAC and advising in promoting the growth of electrochemistry. Our sincere thanks are to*

*the Board of Research in Nuclear Sciences (BRNS), Council of Scientific and Industrial Research (CSIR), Department of Science and Technology (DST) and Defence Research and Development Establishment (DRDE) for their constant support and encouragement. Special thanks are due to International Society for Electrochemistry (ISE) for co-sponsoring this Discussion Meet. The editors are pleased to acknowledge the support provided by Dr V. Venugopal, Director, Radiochemistry and Isotope Group and Dr T. Mukherjee, Director, Chemistry Group at BARC in organizing DM-ISEAC-2011.*

*Sincere thanks are due to the managing committee members of ISEAC and the Technical Committee of DM-ISEAC-2011 for their keen interest and support in organizing this event. It is also a great pleasure to acknowledge the enthusiastic support and keen interest shown by various vendors of electrochemical instrumentation for their participation in DM-ISEAC-2011. We also thank all the authors for submitting their manuscripts.*

*Finally, we express our deepest sense of gratitude to our colleagues in the Electrochemistry Section of Fuel Chemistry Division, BARC for their untiring efforts and cooperation in organizing this activity under the auspices of ISEAC.*

*We take this opportunity to wish all the delegates a pleasant stay in Thiruvananthapuram and stimulating discussions during DM-ISEAC-2011. **We also wish to inform about the next activity of ISEAC (i.e. ISEAC-WS-2011), which will be organized at Goa during December 7-10, 2011.***

*Editors*

# CONTENTS

## *Invited Talks (IT)*

*(Invited Speakers' names are underlined)*

<i>IT-1</i>	Exploring Graphene as a Potential Electrode Material	1
	<i>Dale A.C. Brownson, Jonathan P. Metters, Dimitrios K. Kampouris and <u>Craig E. Banks</u></i>	
<i>IT-2</i>	DNA Nanostructures for Electrochemical Sensing	9
	<i><u>A.M. Oliveira-Brett</u>, V.C. Diculescu, A.-M. Chiorcea-Paquim and S.C.B. Oliveira</i>	
<i>IT-3</i>	New Strategies and Materials for Electrochemical Sensors and Biosensors	16
	<i><u>Christopher M.A. Brett</u></i>	
<i>IT-4</i>	Bioarchitectures based on Functionalized Films and Carbon Nanotubes for Electroanalysis or Energy Conversion	26
	<i><u>Serge Cosnier</u></i>	
<i>IT-5</i>	Subtractive Anodic Stripping Voltammetry at Silver and Gold Electrodes with the Involvement of Underpotential Deposition	35
	<i><u>E. Kirowa-Eisner</u></i>	
<i>IT-6</i>	Role of MnO <sub>x</sub> Electrode for use in Batteries and Fuel Cells	49
	<i><u>Julio B. Fernandes</u></i>	
<i>IT-7</i>	Metalloporphyrin Complexes as Sensing Materials in the Electrochemical Determination of Certain Pharmaceuticals	57
	<i><u>K. Girish Kumar, Leena Rajith and Renjini Joseph</u></i>	

IT-8	Surface Modification by Carbon Nanotubes/ Fullerenes in Electroanalysis –WHY?	69
	<u>Rajendra N. Goyal</u>	
IT-9	Voltammetric Investigations on Semiconductor Q-Dots	74
	<u>Santosh K. Haram, Pravin P. Ingole and Shukatali Inamdar</u>	
IT-10	Preparation of Nanostructured Conducting Polymer on Electrospun Polymer Nanofibre and Characterization	75
	<u>Paramasivam Manisankar, Shanmugasundaram Komathi, Subramanian Palaniappan, Anantha Iyengar Gopalan and Kwang-Pill Lee</u>	
IT-11	Voltammetric Sensing of Hg <sup>2+</sup> and Cu <sup>2+</sup> Ions by Anthrone Derivatives	81
	<u>Susheel K Mittal, Subodh Kumar, Karamjit Kaur and Ashwani Kumar</u>	
IT-12	Conducting Polymers for Corrosion Protection of Mild Steel	95
	<u>Pradip Premchand Patil</u>	
IT-13	Atomic Cluster and Molecularly Imprinted Conducting Polymer Materials based Sensors for Cancer Biomarkers	98
	<u>T. Prasada Rao</u>	
IT-14	Pyrochemical Reprocessing of Metallic Fuels – An overview	101
	<u>B. Prabhakara Reddy, K. Nagarajan and P.R.Vasudeva Rao</u>	

IT-15 Convolution Potential Sweep Voltammetry for Analysis of Electron Transfer Processes 106

M.V. Sangaranarayanan

IT-16 Nano Molecular Species Encapsulated Nafion Membrane Modified Electrode for Selective Electrochemical Sensor Applications 107

Annamalai Senthil Kumar

IT-17 Electrochemical Sensors for Biological Analytes Based on Nanocomposite Materials Prepared using Carbon Nanotubes 112

Manorama Singh and Ida Tiwari

### ***Short Lectures (SL)***

*(Speakers' names are underlined)*

SL-1 Pushing the Boundaries of Screen Printed Electrodes : A Review 120

Jonathan P. Metters, Rashid O. Kadara and Craig E. Banks

SL-2 Nanoporous Membrane Biosensors towards Rapid and Direct Detection of Viruses 127

Binh T.T. Nguyen and Chee-Seng Toh

SL-3 Anthraquinone Functionalized Carbon Composite Electrode : Application to Ammonia Sensing 132

Thippeswamy Ramakrishnappa, Malingappa Pandurangappa and Jay D. Wadhawan

***Contributed Papers (CP)***  
(Poster presenters' names are underlined)

CP-1	Chronoamperometric Studies of Palladium at HMDE	141
	<i><u>V.T. Aher</u>, H. Bose and A.V. Kulkarni</i>	
CP-2	Square Wave Anodic Stripping Voltammetry for Trace Level Determination of Cadmium in Gallium Employing Bismuth-Film Electrode	146
	<i><u>Jisha S. Pillai</u>, Saurav K. Guin, J.V. Kamat and Suresh K. Aggarwal</i>	
CP-3	New Amperometric Method for The Trace Determination of Sb(III) and Te(IV) with Thioglycolic Acid	150
	<i><u>Priti Boora</u> and S.P. Khatkar</i>	
CP-4	A Novel Biamperometric Methodology for Thorium Determination using EDTA as Titrant : Studies on the Effect of pH and Uranium	155
	<i><u>P.R. Nair</u> and Jayashree S. Gamare</i>	
CP-5	Electrocrystallization of Molecular Aspirin: An Approach to Augment Crystal Properties	160
	<i><u>S.N. Patil</u>, M. Mishra, S. Priyadarshini, P. Kayshap, A.K. Dorle and S.N. Sakarkar</i>	
CP-6	Activated Direct Electron Transfer of Cytochrome c at Au Bionanoconjugates for Electrocatalytic Detection of Superoxide Dismutase Enzyme	164
	<i><u>K. Vengatajalabathy Gobi</u> and K. Koteswara Reddy</i>	
CP-7	DFT-COSMO Modeling on the Single Redox Potential of Aqueous Alkali Metal Ions	169
	<i><u>Sk. M. Ali</u>, A. Boda, M.R.K. Shenoj, H. Rao and S.K. Ghosh</i>	

CP-8	Effect of Stabilizing Agent on Electrocrystallization of Silver: A Mechanistic Study	174
	<u>Saurav K. Guin, Jisha S. Pillai, Rohan Phatak and Suresh K. Aggarwal</u>	
CP-9	In situ electrodeposition of <sup>57</sup> Co for the preparation of radioactive source	179
	<u>J. Udhayakumar, Manoj Kumar, Shyamala S. Gandhi and Ashutosh Dash</u>	
CP-10	Deposition of Ytria Stabilized Zirconia Layer for Solid Oxide Fuel Cell by Two Step Process-Electrophoretic Depositions Followed by CVD	183
	<u>John T. John, Vivekanand Dubey and Vivekanand Kain</u>	
CP-11	Estimation of Antimony(III) & Antimony(V) in Simulated Primary Coolant Water by Differential Pulse Anodic Stripping Voltammetry	188
	<u>Suvarna Sounderajan, G. Kiran Kumar and A.C. Udas</u>	
CP-12	Studies on the Preparation and Corrosion Behavior of Electroless Ni-P-Si <sub>3</sub> N <sub>4</sub> Coating	193
	<u>C.M. Das and R. Fotedar</u>	
CP-13	In-situ Electrochemical Synthesis of Gold Nanoparticles in Cellulose Triacetate Membrane	199
	<u>Arvind S. Ambollikar, Manoj K. Sharma and Suresh K. Aggarwal</u>	
CP-14	Electrochemical Determination of Trace Levels of Hg in Cobalt-Containing Samples Using Carbon Paste Electrode	203
	<u>S. Sahoo, A.K. Satpati and A.V.R. Reddy</u>	

CP-15	Conducting Polymer Carbon Composites : Synthesis and Applications	208
	<i>Yashpal Sharma and <u>Ashok K. Sharma</u></i>	
CP-16	Polyaniline Based Electrochemical Sensor for Estimation of Uric Acid	212
	<i>Bhawana N. Thakur and Shilpa N. Sawant</i>	
CP-17	Electrochemistry of U(VI) in Hydrophilic Room Temperature Ionic Liquid : 1-Butyl-3-Methylimidazolium Octyl Sulphate (BMIMOS)	215
	<i><u>K.V. Lohithakshan</u>, Saurav K. Guin, J.V. Kamat and S.K. Aggarwal</i>	
CP-18	Drugs Based Potentiometric Sensors	219
	<i><u>Barkha Singhal</u>, Vinod Kumar Gupta and Ashok Kumar Singh</i>	
CP-19	Electrochemical Investigation of 2-( <i>o</i> -Hydroxyphenyl) Benzoxazole on Glassy Carbon Electrode	226
	<i><u>M. K. Dey</u>, A.K. Satpati and A.V.R. Reddy</i>	
CP-20	A Mechanistic Study of Selective one Electron Oxidation Reaction of <i>Reactive Red-120</i> Azo Dye	230
	<i><u>Jhimli Paul</u>, Saurav K. Guin, D.B. Naik, Suresh K. Aggarwal, S.K. Sarkar and S. Sabharwal</i>	
CP-21	Simultaneous Determination of Pb(II), Cd(II) and Cu(II) in Sediment Samples by Square Wave Anodic Stripping Voltammetry at Bismuth Film Electrode	235
	<i><u>Sunil Bhalke</u>, J.V. Kamat, G.G. Pandit and S.K. Aggarwal</i>	

CP-22 Electroless Manganese Oxide Coating for Reduction Reaction in Alkaline Fuel Cell 239

Harsha P. Uskaikar, Brenda Dias Barreto, Rahul Mohan and Sahina Gazi

CP-23 Electrochemical Reduction of Tianeptine at Glassy Carbon Electrode 243

M. Kumari, K.K. Jhankal, H. Sharma and D.K. Sharma

### ***Research Scholars' Presentations (RS)***

*(Research Scholars' names are underlined)*

RS-1 Voltammetric Sensor for the Assay of 2,8-Dihydroxyadenine : a DNA Base Damage 247

Sanghamitra Chatterjee and Rajendra N. Goyal

RS-2 Mechanistic Studies of Tyrosine Sensing at Copper Oxide Modified Molecularly Imprinted Polypyrrole Coated GCE in Acetate Medium 252

Varghese Saumya and T. Prasada Rao

RS-3 Amperometric Trace Determination of Os(VIII) with Thioglycolic Acid 259

Ritu Langyan, V.B. Taxak and S.P. Khatkar

RS-4 Electrochemical and Surface Analytical Studies of Corrosion Inhibition of Carbon Steel using 1-Hydroxyethane-1,1-diphosphonic Acid (HEDP) – Zinc Ions–Ascorbic Acid System 263

B.V. Appa Rao and S. Srinivasa Rao

RS-5 Electroanalytical Studies of Self-assembled Nano Films of N-Octadecyl Benzotriazole on Copper for Corrosion Protection 268

B.V. Appa Rao and M. Narsimha Reddy

RS-6	A Systematic Study on the Electrocatalysis Mechanism of Fe(III)/Fe(II) Redox Reaction Mediated by Polyaniline Coated Platinum Electrode	274
	<i><u>Ruma Gupta, Saurav K. Guin and Suresh K. Aggarwal</u></i>	
RS-7	Electroanalysis of Three Calcium Channel Blockers on Sodium Montmorillonite Clay Modified Electrode	279
	<i><u>A. Mohamed Sikkander, R. Sasikumar, C. Vedhi and P. Manisankar</u></i>	
RS-8	Electrochemical Hydrogen Peroxide Biosensor Based on Safranin O/PVA modified GC Electrode	284
	<i><u>Manorama Singh and Ida Tiwari</u></i>	
RS-9	Electroanalysis of <i>Reactive Red-2</i> using Multiwall Carbon Nanotube modified Electrode	288
	<i><u>M. Sethupathy, R. Sasikumar, J. Anandha Raj and P. Manisankar</u></i>	
RS-10	Electrocatalytic Oxidation of NADH Using Catechol/Catechol Derivatives Encapsulated Carbon nanotube Modified Electrode	293
	<i><u>Puchakayala Swetha and Annamalai Senthil Kumar</u></i>	
	<b>Biodata of Invited Speakers</b>	298
	<b>Photographs of Short Lecturers' and Research Scholars'</b>	307
	<b>Author Index</b>	309