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Report on

Electrochemical Corrosion Techniques:Theory and Hands on Training

March 17-18, 2023

Jointly Organized by

Department of Civil Engineering & Chemistry

BSA Crescent Institute of Science and Technology

Supported By

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Dr. M. S. Haji Sheik Mohammed
Dean, School of Infrastructure

Dr. I. Raja Mohammed
Dean, SPCS

Co- Convener

Dr. N. Hajara Beevi
Prof & Head, Department of Chemistry

Coordinators

Dr. N. S. Shafeer Ahamed
Assistant Professor (Sel.Gr)
Department of Civil engineering

Dr. N. Vasimalai
Asst. Professor (Sl.Gr.)
Department of Chemistry

Introduction

Corrosion can be viewed as a universal problem. It is a dynamic problem that needs multi- disciplinary approach to solve it. It has an adverse effect on the economy of the world.Corrosion costs of $2.5 trillion annual cost worldwide, which is equivalent to 3-4% of the global Gross Domestic Product (GDP). In India, corrosion expenses of $2.5 trillion each year create a 4% loss in India's GDP.

Every year on April 24th, World Corrosion Organization (WCO) commemorates “World Corrosion Awareness Day” to underline the impact of corrosion.

The detrimental effect of corrosion has caused multiple disasters and deterioration of various important infrastructures worldwide. To list a few, the Bhopal gas tragedy that resulted in the deaths of 3000 people caused by both methyl isocyanide chemical and corrosion of the stainless -steel tank wall, the galvanic corrosion of the iron armature in contact with the copper skin made the restoration of Statue of Liberty most necessary and the restoration of the Queen of Indian bridges, the Pamban Bridge made indispensable.

Objectives of the workshop:

The workshop has provided a platform to get knowledge on the latest advancement in electrochemical corrosion and its control techniques in the field of science and technology.This workshop was planned in order to provide an introduction to the use of electrochemical techniques in corrosion applications.

- Emphasis is placed on the use of modern instruments to acquire pertinent data.
- This will provide an insight knowledge on practical aspects of corrosion.
- Participants will have the opportunity to acquire state-of-the-art instruments inlaboratory sessions designed to complement the lecture sessions.
- Techniques for proper interpretation of data for use in corrosion prediction,prevention and monitoring will also be emphasized.

The two-day workshop is aimed to train the postgraduate students, research scholars, faculty of arts & science and engineering colleges, and industry personnel in electrochemical analytical equipment’s.

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Deemed to be University u/s 3 of the UGC Act, 1956

AMPP India Section

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PROGRAMME SCHEDULE

2nd Two Day Workshop on ELECTROCHEMICAL CORROSION TECHNIQUES: THEORY AND HANDS ON TRAINING

March 17 & 18, 2023

BSA Crescent Institute of Science and Technology, Vandalur, Chennai

DAY 1 – March 17, 2023 (Friday)

Venue: Seminar Hall 1, Convention Centre

Time	Topic	Resource Person (s)
08:30 to 9:00 am	Registration	
09:00 to 9:45 am	Inaugural function	
09:45 to 10:45 am	Basics of Corrosion & its Forms	Dr. A. Poonguzhali, Scientific Officer(F), CSTD, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam.
10:45 to 11:00 am	Tea Break	
11:00 to 12:00 pm	Basics of Electrochemistry, Testing & Monitoring	Dr. S. Rangarajan, Former Head, Water and Steam Chemistry Division, BARCF Kalpakkam.
12:00 to 1:00 pm	Advanced Electrochemical Techniques	Dr. S. Ningshen, Head, CSTD & CEPS, Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam
01:00 to 2:00 pm	Lunch Break	
02:00 to 4:00 pm	Hands on Training – Chemistry and Civil Engg. Department Laboratories	Research scholars of Anna University and BSACIST & M/s. Metrohm India Pvt. Ltd., Chennai

DAY 2 – March 18, 2023 (Saturday)

Venue: CSB Seminar Hall, 6th floor, Architecture Block

Time	Topic	Resource Person(s)
08:45 to 09:15 am	QUIZ 1	
09:15 to 10:00 am	Cathodic Protection: Galvanization vs Sacrificial Anodes	Dr. M.S. Haji Sheik Mohammed, Professor, Department of Civil Engineering BSACIST
10.10 to 10.45 am	Corrosion Inhibitors and its Applications	Dr. S. Kutti Rani, Professor, Department of Chemistry, BSACIST
10:45 to 11:00 am	Tea-break	
11:00 to 12:00 pm	Electronically Conductive Coatings for Corrosion Protection	Dr. Raman Vedarajan, Scientist, Centre for Fuel Cell Technology, International Advanced Research Centre for Powder Metallurgy and New Materials, Chennai
12:00 to 01:00 pm	Advanced Techniques for Monitoring – Electrochemical Impedance Spectroscopy	Dr. S. Ramanathan, Professor, Department of Chemical Engineering, IIT Madras
01:00 to 02:00 pm	Lunch Break Interaction with Students	Dr. S. Ramanathan, Professor, Department of Chemical Engineering, IIT Madras
02:00 to 03:30 pm	Hands on Training – Chemistry and Civil Engg. Department Laboratories & Quiz 2	Research scholars of IIT, Madras and BSACIST & M/s. Metrohm India Pvt. Ltd., Chennai
03:30 to 03.45 pm	Tea break	
03.45 to 04.15 pm	Valedictory Function (Certificate Distribution)	

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Figure 1: Photo taken during the inauguration of the workshop

Figure 2: Welcome address by Dr. M.S. Haji Sheik Mohammed / Dean (SOI)

Figure 3 : Felicitation by Dr. S. Rangarajan / Former Head, WSCD, BARCF

Figure 4 : Presenting Memento to Dr. S. Ningshen / Head, CSTD & CEPS, IGCAR

DAY 1 – SESSION 1

TOPIC: Basics of Corrosion and its Forms

Dr. A. Poonguzhali presented on the topic “Basics of Corrosion and its forms” which gave a clear understanding about types of corrosion, factors influencing corrosion, prevention and control of corrosion. She started the presentation with the inputs on major impact of corrosion on industries and economic sectors.

She stated that thermodynamically corrosion can never be prevented. She then discussed about the interdisciplinary nature of corrosion and their synergistic influence of various parameters of material, environment and their interfaces playing a key role in the failure of components due to corrosion.
She then explained the various types of corrosion, electrochemical nature of corrosion with relevant chemical equations.

She then highlighted the various factors influencing corrosion, which includes

- Solution pH
- Oxidizing agent
- Temperature
- Velocity
- Surface films

Further, she discussed about various types of corrosion in detail and their prevention and control measures. To list a few, Galvanic corrosion, Dealloying / selective leaching, Graphite corrosion, Localized corrosion, Pitting corrosion, Crevice corrosion, Filiform corrosion, Erosion corrosion, Cavitation corrosion, microbiologically induced corrosion, High temperature corrosion etc.,
Later, she concluded the presentation with various measures to control corrosion, which includes

- Selection of proper material
- Proper design of equipment
- Altering environment
- Cathodic protection
- Sacrificial anode method
- Anodic protection

DAY 1 – SESSION 2

TOPIC: Basics of Electrochemistry, Testing & Monitoring

Dr. S. Rangarajan gave a lecture on the topic "Basics of Electrochemistry, Corrosion Testing and Monitoring". He had begun the presentation with the basics of electrochemistry which gave an adequate input on metal/solution and solution/solution interfaces. He then discussed the electrode potential measurement along with Electromotive Series of metals, Effect of concentration on electrode potentials: The Nernst equation for better understanding. He stated Faraday's first and second law of electrolysis.

He explained the various corrosion testing techniques with many illustrations.In LPR method, the two electrode and three electrode system were discussed. LPR method is very quick, direct reading and recording of corrosion rate is possible. But it can only be used to liquids that conduct electricity.

He then talked about Tafel Extrapolation method and its limitations. He introduced Electrochemical Impedance Spectroscopy which uses sinusoidal voltage and current perturbations to study electrode processes at equilibrium conditions by understanding electrochemical relaxation phenomena with varying orders of magnitude of frequency from 10^{-4} Hz to 80 MHz.

Further he described the electrochemical noise analysis and its application in Pit inhibition, SCC crack propagation, MIC in buried pipelines, inhibitor evaluation, weld corrosion, biocide efficacy etc.

He then talked about the mostly widely used method for measuring material loss occurring in the interior of plant and pipelines which is Electrical Resistance Monitoring where it utilizes an ER probe comprises of a sensing element, as a loop material made from wire or strip which is used to conduct an electrical signal.

Later, he concluded the session by suggesting books for future references. Few books he cited are list below:

- Mars G. Fontana, "Corrosion Engineering", third edition, Mc Graw hill Inc.,1987
- ASM handbook – Vol 13: Corrosion, ASM International,2001

DAY 1 – SESSION 3

TOPIC: Advanced Electrochemical Techniques

Dr. S. Ningshen, started the session with his lecture on the topic "Advanced Electrochemical Techniques for Corrosion Monitoring". He emphasized on the significance of corrosion monitoring techniques in combating corrosion, which can have major economic and safety implications. He discussed the statistics of global cost of corrosion which is estimated to be US$2.5 trillion which could be minimized by 15 to 35% of the cost of corrosion if available corrosion control practices are utilized

properly. He addressed some of the infamous corrosion catastrophes like Aloha Airlines Flight-243 incident, Silver bridge collapse, Erika sinking etc., which should be known to avoid in future with proper corrosion monitoring.

He stated that corrosion monitoring is the practice of acquiring information on the progress of corrosion-induced damage to material. He also highlighted the several other benefits of corrosion monitoring techniques like

- To inspect and predict the corrosion damage level of structures
- To obtain information on the state of equipment by providing an early detection to the damaging process.
- To improve operational reliability of new and/or modified plants andprocesses.

Further he discussed the corrosion testing methods which was classified into three major types. They are: 1.Laboratory tests, 2. Field tests 3. Service tests.

He then discussed the Standard of corrosion testing methods and their types like ASTM, NACE, SSPC, API, AWS, SO etc., for corrosion testing. He gave a detailed talk on Electrochemical noise (ECN) for corrosion monitoring, Field corrosion detection of nuclear materials using ECN, EN-based corrosion monitoring system, their advantages and disadvantages.

Lastly, he gave inputs on future developments, such as wireless, intelligent and automatic electrochemical measurement, that will augment the present electrochemical methods of evaluating corrosion degradation.

DAY 1 – SESSION 4 (Post Lunch)

Hands on Training – Chemistry and Civil Engg. Department Laboratories

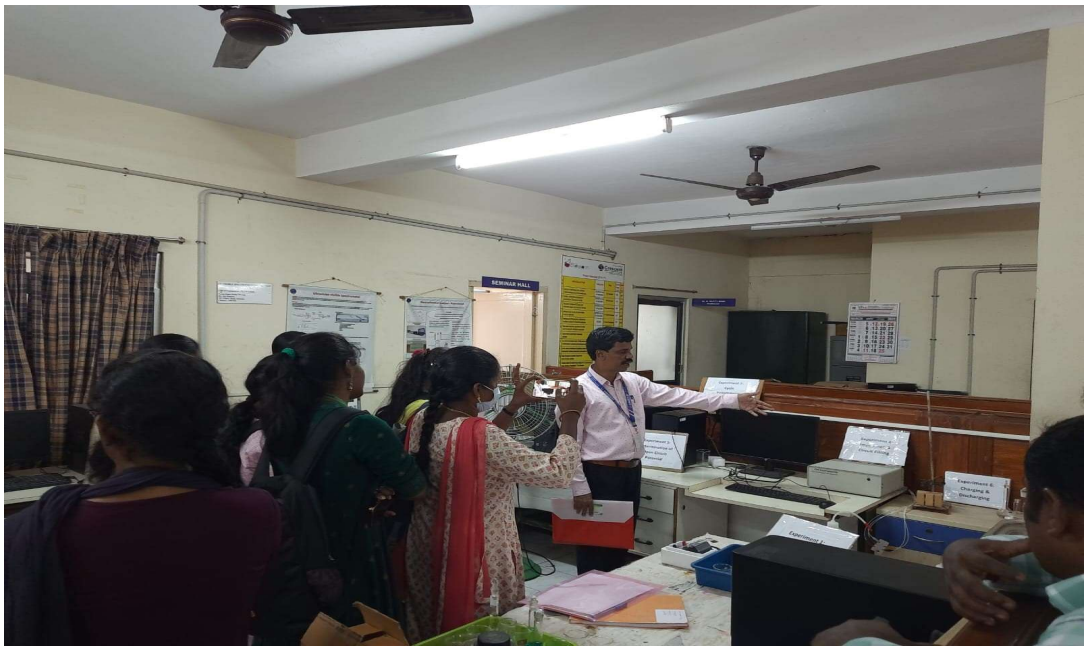

Figure 5: Hands on Training on Electrochemical corrosiontechniques at Chemistry lab, BSACIST

DAY 2 – SESSION 1

TOPIC: Cathodic Protection: Galvanization vs Sacrificial Anodes

Dr. M.S. Haji Sheik Mohammed presented on the topic "Cathodic Protection: Galvanization Vs Sacrificial Anode". He started the lecture with the various infrastructure developments in India and the budget allocated by the Government of India. He emphasized the balanced approach needed to enhance the durability and service of buildings. The major consequences of corrosionlike reduction in original diameter, cracking, rust stains were also discussed. He discussed the major causes and types of corrosion in concrete structures which includes carbonation-induced corrosion, chloride-induced corrosion.

He then explained about the Galvanized steel rebars and its mechanism of corrosion resistance. The two manufacturing procedures are Hot Dip Galvanization and Continuous Galvanization. The advantages of galvanized rebars are

- Uniform thickness
- Sacrificial protection to steel
- Bond strength development

Further he highlighted various performance evaluation tests like Chemical resistance test, applied voltage test, Open circuit potential test and so on indetail.

He introduced the Sacrificial Anode Cathodic Protection with its advantages and disadvantages. Anode galvanically protects surrounding rebar. He talked about the performance of SACP system against stimulated marine exposurewith its experimental procedure. Later he has mentioned various research findings on galvanized rebars like

- Excellent chemical resistance in 3M $CaCl_2$, Sat.Ca $(OH)_2$ and distilled water medium.
- Impact & adhesion test results satisfy the codal requirements

Finally, he concluded with some inputs on major constraints in the application of SACP system.

DAY 2 – SESSION 2

TOPIC: Corrosion inhibitors and its application

Dr. S. Kutti Rani started the presentation with the quote of Ratan Tata which was stated as, “None can destroy iron but its own rust can. Likewise, none can destroy a person but his own mindset can”. She presented on the topic “Corrosion inhibitors and its application”. She discussed about the basics of corrosion and the factors influencing corrosion. She also discussed some facts about corrosion like

- Corrosion is a natural process
- It is the reverse of metal extraction
- It is an electrochemical process

She highlighted the economic impact of corrosion in India. According to National Association of Corrosion Engineers (NACE), the annual loss of corrosion is estimated to be 3 to 5 % of GDP.

She explained about the inhibitors and their role in corrosion control. Inhibitoris a substance which effectively decreases the corrosion rate of a metal when added in small amount to the corrosive environment. Different types of inhibitors are: Anodic inhibitors, cathodic inhibitors, Inorganic inhibitors and Organic inhibitors.

She spoke about the criteria for inhibitor selection where the solubility of the inhibitor in water or alcohol is an important factor. The solvent in which the inhibitor is applied should be expensive, non-toxic and non-hazardous. Among the alternative corrosion inhibitors, organic products containing one or more polar functions (with N,O and S atoms) have shown to be quite efficient to prevent corrosion, as well as heterocyclic compounds containing polar groups and pi-electrons.

Finally, she discussed about the application of nanomaterial in corrosion protection inhibitors and coatings. The difference between nano-coating and conventional coating were also discussed. The extract of naturally occurring substances such as seeds, peels, fruits of some plants proved a good inhibition efficiency for metal corrosion in various media.

DAY 2 – SESSION 3

TOPIC: Electronically conductive coatings for corrosion protection

The presentation on “Electronically conductive coatings for corrosion protection” was given by **Mr. Raman Vedarajan** which gave a wide understanding on polymer electrolyte membrane fuel-cells. He started the presentation with the input of various centres at ARCI which work on coatings like Centre for Carbon Materials (CCM), Centre for Nanomaterials (CNM),and Centre for Solar Energy Materials (CSEM) and so on.

He then highlighted the key applications requiring conductive protection like artificial skin, solar cell, supercapacitor, drug delivery and battery. He gave a detailed lecture on Polymer Electrolyte Membrane Fuel Cell, its component, functions, design and manufacture. For full market implementation of PEM fuel cells to become a reality, two main limiting technical issues must be overcome – cost and durability. Further, he discussed the electrochemical corrosion of carbon in PEMFC and its limitations. He explained about the bipolar plate durability and challenges and conductive coatings on metallic bipolar plate.

He then talked about carbon coatings which is a suitable surface modification process that have been tried. In amorphous carbon coating, the composite coating is stable, corrosion resistant and adherent under both cathodic and anodic environments of the fuel cell.

He then mentioned about the oxynitrides which are of special interest in energy conversion and storage techniques. CrON an electrocatalyst for OER reaction.He illustrated the experimental setup of oxynitrides with relevant chemical equations.

He concluded the lecture with the inputs of current project work of Chromium nitride and titanium nitride utilized coatings.

DAY 2 – SESSION 4

TOPIC: Electronically conductive coatings for corrosion protection

The final lecture was delivered by **Dr. S. Ramanathan** on the topic "Electrochemical Impedance Spectroscopy – An Introduction". He started the presentation by discussing the basics of electrochemistry which included the components of Electrode Electrolyte Interface with pictorial representation.

He then highlighted the Electrochemical Techniques like

- DC – Potential, Current, Time
    - Linear Polarization
    - Chrono amperometry, Chrono potentiometry
    - Cyclic voltammetry
- AC Technique
    - Impedance Spectroscopy
    - AC Voltammetry

He gave a detailed lecture on Electrochemical Impedance Spectroscopy about its principle, components, working and impedance calculation. He thenmentioned about data acquisition in EIS, its instrumentation in particular about their frequency range.

Further Dr. S. Ramanathan, explained about data representation using anexample circuit and its graphical representation and gave few more inputs ondata analysis. The important parameter in corrosion is Polarization Resistance (R_P) which influences the low frequency limit of faradaic impedance.

He talked about the pitfalls of EIS – Data analysis. Some of the pitfalls are:

- If time constants are close to each other, we cannot distinguish them easily.
- A circuit fitting program can be used – A circuit with one time constant willnot fit the data. We will need two-time constants to model the data.

He then discussed the pros and cons of EEC. He concluded the presentation stating that EIS alone is not sufficient to identify the process. It can help eliminate some possibilities and narrow down the choices. To obtain clear insights, often we need to analyse in combination with other techniques (XPS, Potentiodynamic polarization)

DAY 2 – Post Lunch

Hands on Training – Chemistry and Civil Engg. Department Laboratories

Figure 6: Hands on Training on Electrochemical corrosiontechniques at CMTL lab, BSACIST

Figure 7: Valedictory Function

Dr. M.S. Haji Sheik Mohammed

Dean, School of Infrastructure

Annexure

Brochure of the program

Important Dates

Submission of Application: 06th March 2023

Intimation of Acceptance : 08th March 2023

Workshop : 17th and 18th March 2023

Venue

Seminar Hall, Convention Centre,
B.S. Abdur Rahman Crescent Institute of Science and Technology, Chennai.

Registration Fees

Students/Research Scholars	: Rs. 750
Faculty from Institutions	: Rs. 1,500
Delegates from Industries	: Rs. 2,500

Registration link

https://forms.gle/J5XDc5ZfGTugN7e96

OR

(Crossed Demand Draft in favour of "Dept of Civil Engineering, B.S. Abdur Rahman Crescent Institute of Science & Technology" payable at Chennai-48)

For NEFT Transfer:

Name of a/c Holder : Dept of Civil Engineering, B.S. Abdur Rahman Crescent Institute of Science & Technology

Account No.	: 165701000019251
Nature of Account	: Savings Account
Bank Name & Branch	: Indian Overseas Bank, Vandalur
IFSC Code	: IOB0001657
MICR Code	: 600020102

PATRONS

Dr. T. Murugesan, Pro Vice-Chancellor

Dr. N. Raja Hussain, Registrar

CONVENERS

Dr. M.S. Haji Sheik Mohammed, Dean, School of Infrastructure

Dr. I. Raja Mohamed, Dean, SPCS

CO-CONVENER

Dr. N. Hajara Beevi, Head, Department of Chemistry

ADVISORY COMMITTEE

Dr. U. Kamachi Mudali, Former Chairman & Chief Executive of Heavy Water Board, Govt. of India & Advisor, NIGIS-SZ

Dr. Radhakrishna G. Pillai, Professor, Department of Civil Engineering, IIT Madras

Dr. N. Rajendran, Professor & Head, Department of Chemistry, Anna University

Address for Correspondence:

COORDINATORS

Dr. N. S. Shafeer Ahamed, Assistant Professor, Department of Civil Engineering

Dr. N. Vasimalai, Assistant Professor (Sl. Gr.) Department of Chemistry

B.S. Abdur Rahman Crescent Institute of Science and Technology, Vandalur, Chennai-600048.

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vasimalai@crescent.education / 9884871402

shafeer@crescent.education / 9952196629

B.S. Abdur Rahman Crescent Institute of Science & Technology

2nd Two Day Workshop on Electrochemical Corrosion Techniques: Theory and Hands on Training

(17th & 18th March, 2023)

Jointly Organised by

Department of Civil Engineering & Department of Chemistry

B.S. Abdur Rahman Crescent Institute of Science and Technology, Chennai - 48

AMPP India Section

NACE GATEWAY INDIA SECTION NIGIS South Zone

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About the Institution

B.S. Abdur Rahman Crescent Institute of Science and Technology, (deemed to be University), Vandalur, Chennai-48, formerly acclaimed as B.S. Abdur Rahman Crescent Engineering College, blossomed into a premier institution for higher education and research in the year 2009. Being an anchor institution in Chennai, it has attracted many students nationwide. The University was accredited with grade 'A+' by NAAC. The University envisages upholding excellence in its entire three dimensional focal areas namely Education, Research and Consultancy. Most of the UG and PG programmes have been accredited by NBA. More than 580 scholars are pursuing Ph.D./ M.S. programme in this Institution. Recently started the UGC entitled & AICTE approved MBA/MCA programmes (online & open distance Programmes). The Quality Management System of the college conforms to the ISO standards and certified accordingly by the Det Norske Veritas (DNV), Netherland.

About the Department of Civil Engineering

The Department of Civil Engineering started in 1984 is one of the Oldest departments of this Institute. The department offers B.Tech. in Civil Engineering, M.Tech. in Structural Engineering and M.Tech in Construction Engineering & Project Management. Also offers Ph.D. in various disciplines of Civil Engineering. The department gives emphasis on 'quality and skill based education', 'application-oriented research' (through network with eminent academic institutions and research laboratories) for the holistic development of students. The department also offers testing & consultancy services to government, semi-govt., and private sectors.

About the Department of Chemistry

The Department of Chemistry emerged as a full-fledged Department in 2009 to offer programs leading to M.Sc. and Ph.D. (part time and full time) degrees. The Department has 18 faculty members with Ph.D. qualification. Faculty members are having expertise in contemporary research areas such as the development of solar and dye sensitized solar cells, wastewater treatment, photocatalysis, synthesis of catalytic, semi-conducting, nano and polymeric materials for various applications and synthesis of novel organic compounds for pharmacological applications. The department is well-equipped with several sophisticated instruments.

About AMPP

The Association for Materials Protection and Performance (AMPP), is a global community of professionals dedicated to materials protection through the advancement of corrosion control and protective coatings. AMPP has accomplished its eminence by increasing its membership and provides members with the knowledge and resources to ensure high performance materials are used to build and maintain sustainable infrastructure. AMPP protects infrastructure and assets worldwide through member and workforce education and credentialing, company accreditation, technological innovation, and global standardization.

About the Workshop

The workshop provides an opportunity to seek knowledge on the latest advancement in electrochemical corrosion and its control techniques in fields of science and technology. This workshop is intended as an introduction to the use of electrochemical techniques in corrosion applications.

Emphasis is placed on the use of modern instruments to acquire pertinent data. This will provide an insight knowledge on practical aspects of corrosion. Participants will have the opportunity to acquire state-of-the-art instruments in laboratory sessions designed to complement the lecture sessions. Techniques for proper interpretation of data for use in corrosion prediction, prevention and monitoring will also be emphasized.

The two-day workshop is aimed to train the postgraduate students, research scholars, faculty of arts & science and engineering colleges, and industry personnel in electrochemical analytical equipments.

Who can Participate

Post Graduate Students / Research Scholars / Faculty members of Chemistry, Civil Engineering, Mechanical Engineering and Metallurgy streams and Industry Personnel.

LECTURE TOPICS

Advanced Electrochemical Techniques
Dr. S. Ningshen
Head, CSTD & CEPS, IGCAR, Kalpakkam

Advanced Techniques of Monitoring -Electrochemical Impedance Spectroscopy
Dr. S. Ramanathan
Professor, Department of Chemical Engineering, IIT Madras

Basics of Corrosion and its Forms
Dr. A. Poonguzhali
Scientific Officer-F, CSTD, IGCAR, Kalpakkam

Coatings for Corrosion Protection
Dr. N. Rajendran
Professor and Head, Department of Chemistry, Anna University

Basics of Electrochemistry, Testing & Monitoring
Dr. S. Rangarajan
Former Head, Water & Steam Chemistry Division, BRCF, Kalpakkam

Cathodic Protection: Galvanization vs Sacrificial Anodes
Dr. M.S. Haji Sheik Mohammed
Professor, Department of Civil Engineering, BSACIST

Corrosion Inhibitors and its applications
Dr. S. Kutti Rani
Professor, Department of Chemistry, BSACIST

Hands on Training on Basic Tests & Advanced Techniques

17.3.2023 (AN)	18.3.2023 (AN)
Dr. N. Vasimalai, Asst. Prof. (Sl.Gr), Dept. of Chemistry, BSACIST & Research Scholars of Anna University, Chennai and BSACIST.	Dr. N. S. Shafeer Ahamed, Asst. Prof., Dept. of Civil Engg., BSACIST & Research Scholars of IIT Madras and BSACIST.

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Department of Civil Engineering
&
Department of Chemistry

Inauguration of 2nd Two Day Workshop on

Electrochemical Corrosion Techniques: Theory and Hands on Training

March 17, 2023 - 09.15 a.m. *Venue: Seminar Hall - 1, Convention Centre*

09:15 to 09:20 a.m.	Quirath	**Mr. Mohammed Ibrahim** *Final Year, B.Tech. Civil Engineering.*
09:20 to 09:25 a.m.	Tamizhthai Vazhthu	
09:25 to 09:30 a.m.	Welcome Address	**Dr. M.S. Haji Sheik Mohammed** *Dean, School of Infrastructure* *BSACIST*
09:30 to 09:40 a.m.	Felicitation	**Dr. I. Raja Mohammed** *Dean, School of Physical and Chemical Sciences*
09:40 to 10:10 a.m.	Address by Chief Guest	**Dr. M. Joseph** *Former Director* *Material Chemistry & Metal Fuel Cycle,* *IGCAR, Kalpakkam.*
10:10 to 10:15 a.m.	Vote of Thanks	**Dr. N. Hajara Beevi** *Head, Department of Chemistry.*

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Department of Civil Engineering
&
Department of Chemistry

Cordially invites you for the Inauguration of
2nd Two Day Workshop on

Electrochemical Corrosion Techniques: Theory and Hands on Training

On 17th March 2023, at 9.15 a.m.
Venue: Seminar Hall I - Convention Centre

Dr. M. Joseph

Former Director, Materials Chemistry & Metal Fuel Cycle
Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam.

has kindly consented to be the chief guest and deliver the inaugural address

Co-ordinators

Dr. N. Vasimalai
Assistant Professor (Sl. Gr)
Department of Chemistry

Dr. N. S. Shafeer Ahamed
Assistant Professor,
Department of Civil Engineering

Co-Convener

Dr. N. Hajara Beevi
Professor & Head,
Department of Chemistry

Conveners

Dr. I. Raja Mohammed
Dean, School of Physical and Chemical Sciences

Dr. M. S. Haji Sheik Mohammed
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