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Selected Technical Papers

Advances in Electrochemical Techniques for Corrosion Monitoring and Laboratory Corrosion Measurements

STP 1609

Editors:
Sankara Papavinasam | Raul B. Rebak
Lietai Yang | Neal S. Berke

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ASTM STOCK #STP1609
DOI: 10.1520/STP1609-EB

ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959
Printed in the U.S.A.

Library of Congress Cataloging-in-Publication Data

Names: Papavinasam, Sankara, 1962- editor. | Rebak, Raul B. (Raul Basilio), 1956- editor. | Yang, Lietai, 1958- editor. | Berke, Neal Steven, 1952- editor. | ASTM Committee G-1 on Corrosion of Metals, sponsoring body.

Title: Advances in electrochemical techniques for corrosion monitoring and laboratory corrosion measurements / edited by Sankara Papavinasam, Raul B. Rebak, Lietai Yang, Neal S. Berke.

Description: West Conshohocken, PA : ASTM International, [2019] | Series: ASTM stock #STP1609 | Includes bibliographical references.

Identifiers: LCCN 2018040917 (print) | LCCN 2018045260 (ebook) | ISBN 9780803176645 (ebook) | ISBN 9780803176638 (pbk.)

Subjects: LCSH: Corrosion and anti-corrosives--Measurement--Congresses. | Nondestructive testing--Congresses. | Electrochemical analysis--Congresses.

Classification: LCC TA462 (ebook) | LCC TA462 .A2377 2019 (print) | DDC 620.1/12230287--dc23

LC record available at https://lccn.loc.gov/2018040917

ISBN: 978-0-8031-7663-8

Peer Review Policy

Each paper published in this volume was evaluated by two peer reviewers and at least one editor. The authors addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and the ASTM International Committee on Publications.

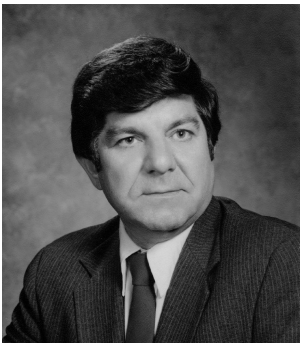
The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of the peer reviewers. In keeping with long-standing publication practices, ASTM International maintains the anonymity of the peer reviewers. The ASTM International Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM International.

Citation of Papers

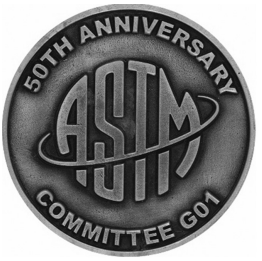
When citing papers from this publication, the appropriate citation includes the paper authors, "paper title," STP title, STP number, book editor(s), ASTM International, West Conshohocken, PA, year, page range, paper doi. A citation is provided on page one of each paper.

Printed in Atlanta, GA
March, 2019

Memorial



This book of selected technical papers is dedicated to the memory of our great friend, colleague, leader, and mentor, Dr. Robert (Bob) Baboian. His leadership and support of electrochemical methods in corrosion testing will long be remembered.



Front and back photos of the memento that Bob distributed at ASTM Committee G01's 50th Anniversary, November 2014.

Foreword

THIS COMPILATION OF Selected Technical Papers, STP1609, *Advances in Electrochemical Techniques for Corrosion Monitoring and Laboratory Corrosion Measurements*, contains peer-reviewed papers that were presented at a symposium held November 13–14, 2017, in Atlanta, Georgia, USA. The symposium was sponsored by ASTM International Committee G01 on Corrosion of Metals and Subcommittee G01.11 on Electrochemical Measurements in Corrosion Testing.

Symposium Chairs and STP Editors:

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Contents

Overview

The global cost of corrosion is estimated at US $2.5 trillion, equivalent to approximately 3.4 % of global Gross Domestic Product (GDP). Studies have indicated that an appropriate application of current knowledge on corrosion control can reduce one third of the cost. ASTM Committee G01 on Corrosion of Metals plays an important role in developing knowledge on corrosion control.

ASTM Committee G01 on Corrosion of Metals was formed in 1964 to promote knowledge, stimulate research, collect engineering data, and develop standard test methods, practices, guides, classifications, specifications, and terminology relating to corrosion and methods for corrosion-protection of metals.

Most corrosion takes place by electrochemical mechanisms. Therefore, electrochemical techniques and tests play pivotal roles in understanding corrosion and in developing appropriate strategies to control corrosion. ASTM Subcommittee G01.11 on Electrochemical Measurements in Corrosion Testing was established in 1965 to address three issues that had been inhibiting the development of electrochemical tests:

- A lack of reproducibility of electrochemical tests and the lack of understanding of the variations in results,
- The absence of standardized procedures for carrying out the tests, and
- The use of several conventions to present electrochemical data that made interpreting the test results difficult.

To address these issues, G01.11 has been organizing symposia on the developments on electrochemical measurements and monitoring, publishing Selected Technical Papers (STPs), and developing standards on promising techniques. At present G01.11 has 19 standards under its jurisdiction and has published over 6 STPs.

The three most recently published STPs by ASTM G01.11 are:

- STP1506, *Advances in Electrochemical Techniques for Corrosion Monitoring and Measurement*, Ed. S. Papavinasam, N. S. Berke, and S. Brossia (2009)
- STP1277, *Electrochemical Noise Measurement for Corrosion Applications*, Ed. J. R. Kearns, J. R. Scully, P. R. Roberge, D. L. Reichert, and J. L. Dawson (1996)
- STP1188, *Electrochemical Impedance: Analysis and Interpretation*, Ed. J. R. Scully, D. C. Silverman, and M. W. Kendig (1993)

To further knowledge, ASTM G01.11 organized a two-day symposium in Atlanta, Georgia, USA, on November 13–14, 2017. The objectives of the symposia were to:

- Pay tribute to one of the eminent scientists, adherent users and promotor of electrochemical techniques, good friend to many, and enthusiastic mentor of young professionals, Dr. Robert Baboian;
- Provide a forum for discussing the recent advances in electrochemical techniques to monitor corrosion in the field and measure corrosion in the laboratory;
- Identify opportunities to develop new standards on specific techniques and methodologies;
- Promote use of electrochemical techniques in field application; and
- Publish an STP.

At the symposium, 30 presentations were made by experts from Argentina, China, Canada, India, Italy, and the USA. Twenty peer-reviewed papers from the symposium are collected in this STP. The papers are arranged in six sections:

- Dr. Robert Baboian Memorial Lecture
- Plenary Sessions
- Application of Electrochemical Techniques in the Field
- Advancement in Electrochemical Techniques in Measuring Corrosion in the Laboratory
- Investigation of Material and Electrolyte Properties Using Electrochemical Techniques
- Integration of Electrochemical Techniques with Other Techniques and Tools

It is hoped that the papers in this STP will provide the state-of-the-art electrochemical techniques for measuring and monitoring corrosion, both in the laboratory and in the field; increase the use of standards on electrochemical techniques in academic institutes in educating next-generation professionals; and lead to the development of new ASTM standards.

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ISBN: 978-0-8031-7663-8
Stock #: STP1609

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