

Introduction to Corrosion Science

By Edward McCafferty

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This textbook is intended for a one-semester course in corrosion science at the graduate or advanced undergraduate level. The approach is that of a physical chemist or materials scientist, and the text is geared toward students of chemistry, materials science, and engineering. This textbook should also be useful to practicing corrosion engineers or materials engineers who wish to enhance their understanding of the fundamental principles of corrosion science. It is assumed that the student or reader does not have a background in electrochemistry. However, the student or reader should have taken at least an undergraduate course in materials science or physical chemistry. More material is presented in the textbook than can be covered in a one-semester course, so the book is intended for both the classroom and as a source book for further use. This book grew out of classroom lectures which the author presented between 1982 and the present while a professorial lecturer at George Washington University, Washington, DC, where he organized and taught a graduate course on “Environmental Effects on Materials.” Additional material has been provided by over 30 years of experience in corrosion research, largely at the Naval Research Laboratory, Washington, DC and also at the Bethlehem Steel Company, Bethlehem, PA and as a Robert A. Welch Postdoctoral Fellow at the University of Texas. The text emphasizes basic principles of corrosion science which underpin extensions to practice.

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Editorial Review

Review

From the reviews:

“The author does an excellent job guiding both the novice and expert corrosion scientist through the content with a clear, concise writing style. … a wide selection of problems at the end of most chapters allows students to test their understanding of the material. … While the text is definitely intended for use in a graduate or advanced undergraduate lecture course in corrosion science, the text would also make an excellent reference for anyone teaching a course in environmental science or electrochemistry.” (Lester L. Pesterfield, Journal of Chemical Education, Vol. 89, 2012)

“Introduction to corrosion science is absolutely ‘the book’ that any student of chemistry, material science and/or engineering studying corrosion science should have on their desk. It contains everything one needs to know about the fundamental principles of corrosion. … Although this textbook is primarily intended for a one-semester course in corrosion science … I find it also beneficial as a comprehensive reference book for professionals. Without a doubt, I would highly recommend it to everyone; this book is simply a ‘must have’.” (Amela Keserovi?, Materials and Corrosion, Vol. 63 (11), 2012)

“I also used this book for a Corrosion Engineering course. … It has the most comprehensive description of electric double-layer theory I’ve seen in any text so far. … The images and diagrams are all nicely laid out. … Since purchasing this book I’ve browsed through about three or four other corrosion texts and still like this one the best.” (Amazon.com, December, 2011)

From the Back Cover

Introduction to Corrosion Science is suitable for a one-semester course in corrosion science at the graduate or advanced undergraduate level for students that do not have backgrounds in electrochemistry but have taken introductory courses in materials science or physical chemistry. The text follows the approach of a physical chemist or materials scientist and is geared toward students of physical chemistry, materials science, and engineering. In addition, practicing corrosion engineers and materials engineers will find useful information that will broaden their understanding of the fundamental principles of corrosion science. This textbook grew out of classroom lectures, which the author presented as a Professorial Lecturer at George Washington University, Washington, D.C.

Chapters on:

o Charged interfaces

o Electrochemical cells

o Thermodynamics of corrosion

o Corrosion kinetics and mixed potential theory

o Concentration polarization and diffusion

o Passivity

o Crevice corrosion and pitting

o Stress-corrosion cracking and corrosion fatigue

o Corrosion inhibitors

o Corrosion under organic coatings

o AC impedance

o High temperature oxidation

Key features:

o Detailed illustrations

o Worked example problems

o Problem sets after each chapter

o Extensive references

o Appendices to show the origin of important equations

About the author:

Dr. E. McCafferty is a Professorial Lecturer at George Washington University and a consultant to the Naval Research Laboratory, Washington D.C., where he has conducted research in corrosion science for over thirty years.

About the Author
Dr. E. McCafferty conducted research in corrosion science for over thirty years at the Naval Research Laboratory. He was also a part-time Professorial Lecturer at George Washington University.

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From reader reviews:

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