

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/282624070>

# Alternative futures for corrosion and degradation research

Article in *Corrosion Engineering Science and Technology* · September 2015

DOI: 10.1179/1478422X15Z.000000000383

CITATIONS

0

READS

97

2 authors:



**Benjamin valdez salas**

Autonomous University of Baja California

471 PUBLICATIONS 1,803 CITATIONS

[SEE PROFILE](#)



**Michael Schorr Wiener**

Autonomous University of Baja California

254 PUBLICATIONS 999 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Lubrication [View project](#)



Fabrication and properties characterization of SiO<sub>2</sub>/a-Si: H/SiO<sub>2</sub> structures for potential applications in non-volatile memory devices and UV light sensors [View project](#)

# Alternative futures for corrosion and degradation research

**R. Hummel. 2014. Paperback, Potomac Institute of Policy Studies, Arlington, VA, USA, 258 pp. ISBN: 978-0-9898556-5-5. \$24.95.**

This is the book that the international corrosion community, in particular the professionals dealing with corrosion in military equipment, facilities and infrastructure, has been waiting for.

Dr R. Hummel, the author, is Chief Research Scientist at the Potomac Institute for Policy Studies, Arlington, VA, USA, where he directs studies on technology and innovation. The Potomac Institute is an independent, not for profit public policy research institute devoted to science, technology and national security issues. D. J. Dunmire, Director of the Department of Defense Corrosion Policy and Oversight Office, Washington, DC, USA, has contributed a significant foreword. He argues that corrosion and degradation have an enormous impact on the economy and society of a nation, and states that alloys, ceramics, polymers and composites are subject to environmentally induced degradation.

The book starts with a foreword (just mentioned), a preface, a list of acknowledgements and a 10-page introduction, which should be read to understand the book's aim and its organisation.

This is the first book totally devoted to corrosion of military assets including the equipment, facilities and infrastructure produced and used by the armed forces. This work incorporates four chapters devoted to distinct aspects of corrosion science: technology and engineering, corrosion control, the complexities of corrosion, corrosion research status and corrosion research directions. The last chapter (V), presents a summary of the book's findings and recommendations based on the studies, arranged in a condensed box (p. 218).

'Chapter I: The need for corrosion control' treats four major affected areas by corrosion and degradation: defense systems, infrastructure, energy production and distribution of commercial vehicles and manufacturing and products. These subjects are expanded, dealing with corrosion of aircraft, ships,

ground vehicles, nuclear weapons, missiles, bridges, buildings and roadways, water and sewer infrastructure plants, alternative energy, construction equipment, electronics, medical implants and prosthetics. At the end of the chapter, the important corrosion factors and the main findings are listed.

The complexities of corrosion is the theme of Chap. II. It explains in detail the mechanism, causes, types, mitigation and prevention of corrosion and degradation of metals and nonmetals. It describes a special case of corrosion called 'atomic effects corrosion' that involves atoms undergoing changes based on probabilities of occurrence (pp. 90–45, 101).

'Chapter III: Status of the corrosion control research enterprise' identifies issues with the current research activity in terms of missed opportunities and new directions that could be pursued. It presents examples of the fruits of research such as progress in materials processes, research programmes for corrosion control including modelling and simulation, research composite structural materials, materials performance production and corrosion science field. A summary status of research in the corrosion control area closes this chapter.

'Chapter IV: Corrosion research direction' is an overview of corrosion research; it forms the core of this study and offers new and 'out of the box' research direction. The chapter insists that potential benefits of long term research outweigh risk, so long term research objectives should be pursued. The research directions are summarised in a clear box (p. 135) showing three functional approaches to controlling corrosion: design and production, materials and coatings and inspections and maintenance. This information is expanded in an additional enlarged box (p. 137). The corrosion strategy includes prevention, detection when it occurs, production of future events and management of corroded systems.

This publication is essential for scientific, industrial and educational organisations, military personnel, armed forces leaders and government institutions and, furthermore, for their

members engaged in the organisation with particular focus on design and implementation of activities intended to reduce corrosion of materials and structures.

The reviewers, as chemical engineers and corrosion practitioners active in corrosion research and control, enjoyed and benefited reading Chap. I, especially the sections on ground vehicles, aircraft, navy vessels, autos and trucks and commercial and military ships that emphasise the means for corrosion prevention, avoidance and control.

However, there is a problem in this book: subject and text repetitions. The central, fundamental theme of corrosion control is mentioned ~120 times. We understand that, in such an extensive book, it is hard to avoid such repetitions and that these repetitions assert the crucial importance and relevance of corrosion control for the armed forces, the economy and society. Nonetheless, the persistent text repetitions are a flaw in this book.

Hummel's book maps out an innovative approach in battling corrosion and presents functional advances in corrosion control, including the development of new materials and coatings. We would recommend it to numerous professionals: academics and their post-graduate students carrying out basic and applied investigations; corrosion practitioners, researchers and consultants; maintenance engineers and technicians repairing and replacing corroded equipment; economists and accountants calculating costs and expenses of corrosion damages; armed forces engineers and experts in managing corrosion; as well as designers and builders of land and marine structures and facilities.

This compendium is profusely illustrated and displays a great amount of figures, diagrams, photographs (macro and micro), boxes and tables with copious information. The numerous illustrations are especially notable: impressively detailed and colorful, with some spanning a double page spread. Furthermore, the book is enriched with a fantastic number of references, 419 altogether presented as footnotes,

permitting the reader to link the text with its reference, *in situ*. The reference's full title and its website source are provided.

The erudite author, Dr R. Hummel joined with the Potomac Institute and its Press should be congratulated for providing authoritative, practical and useful information on the maintenance

procedures applied to curb corrosion and assurance of the long life service of civil and military infrastructure assets worldwide.

At the book's end appears an alphabetical list of the acronyms of all the institutes and affiliations mentioned in the text. There is also an interesting detailed sequence of image credits and

an alphabetical index of subjects, to facilitate their easy and fast location.

**Dr. Benjamín Valdez,**

**Dr. Michael Schorr,**

*Professors, Institute of Engineering,  
University of Baja California, Mexico*

**Contact:**

**e.leighton@maneypublishing.com**