

Book Review

Surface Modification and Mechanisms: Friction, Stress and Reaction Engineering

Edited by George Totten, G.E. Totten & Associates, LLC, Seattle, Wash. and Hong Liang, University of Alaska, Fairbanks, Alaska. Published by Marcel Dekker, Inc., 2004, Hard cover, 756 pages.

Reviewer:
Dr. Robert M. Gresham,
Contributing Editor

As our science matures, we find we must progressively learn more and more about the surfaces that rub together. This learning involves elucidation of the chemical processes that happen in the first atomic layers of these interacting surfaces. Further, we are learning more about the crystallography or surface structure. As a natural result, we also are learning how to modify or control the nature of these surfaces.

In addition, by applying tribological coatings, we are learning yet another method for obtaining the desired surface properties.

Last year, in reflecting on this important direction in tribological research, STLE formed a new Surface Engineering Technical Committee.

Now there is an excellent new book edited by two well-known STLE members, Drs. George Totten and Hong Liang. This book is important because it provides an *integration* of surface modification reactions and processes to achieve a tribological result and, most important, provides a physical tribochemical (mechanistic) understanding of surface structural changes that occur under a variety of circumstances. There are a number of books available on these various subjects, but this book pulls it all together.

The book consists of four major sections: (1.) residual stress, (2.) reaction processes

and mechanisms, (3.) surface modification by heat treatment and plasma-based methods and (4.) modeling, simulation and design. These headings suggest the scope of this book. Discussions include surface-to-surface interaction; the nature of the interaction of these surfaces with base oils, additives, extreme-pressure additives and boundary lubrication; and the role of electrochemistry in wear processes.

Further, a section covers physical vapor deposition, chemical vapor deposition, ion implantation, laser impingement, hybrid versions of these and nanometer surface modification technologies.

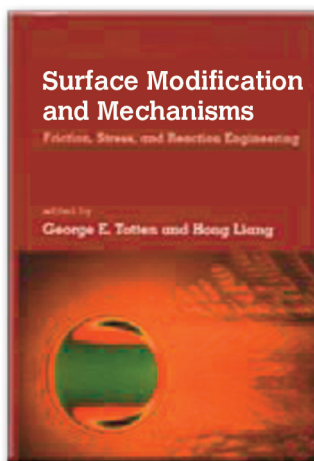
The various chapters are written by an impressive cadre of world-renowned experts from 10 different countries. This book is not casual reading but rather is written for the more technical among us. This book also could be used as a text for advanced undergraduate and graduate students in the field. It is a valuable

resource for material scientists, design engineers, metallurgists, mechanical engineers, tribologists and lubrication engineers.

This is a book that belongs in the technical library of serious researchers in the field. <<



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