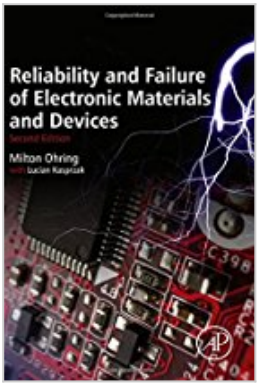

Reliability and Failure of Electronic Materials and Devices, Second Edition

By Milton Ohring, Lucian Kasprzak

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Reliability and Failure of Electronic Materials and Devices is a well-established and well-regarded reference work offering unique, single-source coverage of most major topics related to the performance and failure of materials used in electronic devices and electronics packaging. With a focus on statistically predicting failure and product yields, this book can help the design engineer, manufacturing engineer, and quality control engineer all better understand the common mechanisms that lead to electronics materials failures, including dielectric breakdown, hot-electron effects, and radiation damage. This new edition adds cutting-edge knowledge gained both in research labs and on the manufacturing floor, with new sections on plastics and other new packaging materials, new testing procedures, and new coverage of MEMS devices.

- Covers all major types of electronics materials degradation and their causes, including dielectric breakdown, hot-electron effects, electrostatic discharge, corrosion, and failure of contacts and solder joints
- New updated sections on "failure physics," on mass transport-induced failure in copper and low-k dielectrics, and on reliability of lead-free/reduced-lead solder connections
- New chapter on testing procedures, sample handling and sample selection, and experimental design
- Coverage of new packaging materials, including plastics and composites

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Editorial Review

From the Back Cover
This book introduces the reader to the widely dispersed reliability literature of microelectronic and electro-optical devices. It integrates a treatment of chip models used to explain degradation, and the statistical handling of lifetime data. Electromigration, dielectric breakdown, hot-electron effects, electrostatic discharge, corrosion, radiation damage and the mechanical failure of contacts and solder joints are among the failure mechanisms considered. An underlying book thread concerns product defects-their relation to yield and reliability, the role they play in failure, and the way they are experimentally exposed. The book can be used as an advanced undergraduate/graduate textbook for materials scientists and electrical engineers, and as a reference for reliability professionals.

KEY FEATURES
* Discuss reliability and failure on both the chip and packaging levels
* Handles the role of defects in yield and reliability
* Includes a tutorial chapter on the mathematics of reliability
* Focuses on electomigration, dielectric breakdown, hot-electron effects, electrostatic discharge, corrosion, radiation damage, and the mechanical failure of packages, contacts, and solder joints
* Considers defect detection methods and failure analysis techniques

ABOUT THE AUTHOR
Dr. Milton Ohring, author of two previously acclaimed Academic Press books, The Materials Science of Thin Films (1992), and Engineering Materials Science (1995), has taught courses on reliability and failure in electronics at Bell Laboratories (AT&T and Lucent Technologies). From this perspective and the well-written tutorial style of the book, the reader will gain deeper physical understanding of failure mechnanisms in electronic materials and devices; acquire skills in the mathematical handling of reliability data; and better appreciate future technology trends and the reliability issues they raise.

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In 1988, Dr Lucian Kasprzak became an IEEE Fellow “For contributions to very-largescale-integrated devices through the integration of reliability physics with process development.” He discovered the hot-electron effect in short channel field-effect transistors, while at IBM in 1973. From 1992 to 1996, he was Associate Professor of Physics and Engineering Science at Franciscan University. He retired from IBM in 1995 after 30 years. In 1996, he joined Sterling Diagnostic Imaging as Reliability Manager for the Direct Radiography Program. He became Director of Reliability at Direct Radiography Corp. in 1997. Early in 2001 he became an independent Reliability Consultant.

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