

# Electronic Thin Film Reliability

Thin Film Materials, Processes, and Reliability  
Electronic Thin-Film Reliability  
The Mechanics and Reliability of Films,  
Multilayers and Coatings  
Proceedings of the International Symposium on Thin Film Materials, Processes, Reliability, and  
Applications, Thin Film Processes  
Study on the Reliability of Gap-Type Thin Film Transistors Under Low Illumination  
Thin  
Film Materials, Processes, and Reliability  
Reliability Abstracts and Technical Reviews  
Electromigration in Thin Films and  
Electronic Devices  
Thin-Film Transistor Reliability  
Reliability Study of Poly-Si Thin-film Transistors  
Characterization and  
Reliability Testing of Thin-Film Materials for Robust MEMS Sensors  
Materials Reliability in Microelectronics VII: Volume  
473  
Materials Science of Thin Films  
Review of Progress in Quantitative Nondestructive Evaluation  
Reliability of  
Micromechanical Thin-film Resonators  
Ultra-Thin Film Dielectric Reliability Characterization  
Descendencia de la casa y  
mayorazgo de los Céspedes, de Ciudad Real  
Annual Proceedings, Reliability Physics  
Fortnightly Review  
Contemporary  
Review  
G. S. Mathad  
King-Ning Tu  
Matthew R. Begley  
G. S. Mathad  
Electrochemical Society. Meeting  
Choong-Un Kim  
Meng Zhang, Mingxiang Wang (王明翔) Radoslav Rusanov J. Joseph Clement Milton Ohring Donald O. Thompson  
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Applications, Thin Film Processes Study on the Reliability of Gap-Type Thin Film Transistors Under Low Illumination Thin Film Materials, Processes, and Reliability Reliability Abstracts and Technical Reviews Electromigration in Thin Films and Electronic Devices Thin-Film Transistor Reliability Reliability Study of Poly-Si Thin-film Transistors Characterization and Reliability Testing of Thin-Film Materials for Robust MEMS Sensors Materials Reliability in Microelectronics VII: Volume 473 Materials Science of Thin Films Review of Progress in Quantitative Nondestructive Evaluation Reliability of Micromechanical Thin-film Resonators Ultra-Thin Film Dielectric Reliability Characterization Descendencia de la casa y mayorazgo de los Céspedes, de Ciudad Real Annual Proceedings, Reliability Physics Fortnightly Review Contemporary Review G. S. Mathad King-Ning Tu Matthew R. Begley G. S. Mathad Electrochemical Society. Meeting Choong-Un Kim Meng Zhang, Mingxiang Wang ( ) Radoslav Rusanov J. Joseph Clement Milton Ohring Donald O. Thompson Robert Kazinczi JS. Suehle

the symposium covered three topics i plasma processing for

thin films are widely used in the electronic device industry as the trend for miniaturization of electronic devices moves into the nanoscale domain the reliability of thin films becomes an increasing concern building on the author s previous book electronic thin film science by tu mayer and feldman and based on a graduate course at ucla given by the author this new book focuses on reliability science and the processing of thin films early chapters address fundamental topics in thin film processes and reliability including deposition surface energy and atomic diffusion before moving onto systematically explain irreversible processes in interconnect and packaging technologies describing electromigration thermomigration and stress migration with a closing chapter dedicated to failure analysis the reader will come away

with a complete theoretical and practical understanding of electronic thin film reliability kept mathematically simple with real world examples this book is ideal for graduate students researchers and practitioners

a comprehensive treatment of the mechanics of multilayers and its implications for reliability with easy to use software to compute key results

thin film transistor reliability provides a comprehensive analysis of the reliability challenges in thin film transistors tfts essential components in modern electronics covering topics from fundamental structures to degradation mechanisms this book equips researchers and engineers with the tools to assess analyze and improve tft reliability the book systematically explores key reliability concerns including performance characterization defect states voltage stress effects circuit level degradation and environmental influences advanced reliability analysis methods and practical improvement strategies are also discussed offering insights into future developments key features in depth discussion of tft degradation mechanisms and reliability concerns comprehensive analysis techniques including transfer curve and noise analysis effects of dc ac voltage stress self heating and environmental factors strategies for enhancing tft reliability through structural modifications

the inexorable drive for increased integrated circuit functionality and performance places growing demands on the metal and dielectric thin films used in fabricating these circuits as well as spurring demand for new materials applications and processes this book directly addresses issues of widespread concern in the microelectronics industry smaller feature sizes new materials and new applications that challenge the reliability of new technologies while the

book continues the focus on issues related to interconnect reliability such as electromigration and stress particular emphasis is placed on the effects of microstructure an underlying theme is understanding the importance of interactions among different materials and associated interfaces comprising a single structure with dimensions near or below the micrometer scale topics include adhesion and fracture gate oxide growth and oxide interfaces surface preparation and gate oxide reliability oxide degradation and defects micro structure texture and reliability novel measurement techniques interconnect performance and reliability modeling electromigration and interconnect reliability and stress and stress relaxation

this is the first book that can be considered a textbook on thin film science complete with exercises at the end of each chapter ohring has contributed many highly regarded reference books to the ap list including reliability and failure of electronic materials and the engineering science of thin films the knowledge base is intended for science and engineering students in advanced undergraduate or first year graduate level courses on thin films and scientists and engineers who are entering or require an overview of the field since 1992 when the book was first published the field of thin films has expanded tremendously especially with regard to technological applications the second edition will bring the book up to date with regard to these advances most chapters have been greatly updated and several new chapters have been added

all papers were peer reviewed these proceedings provide the latest research and development papers in nondestructive evaluation nde and its applications to flaw detection material properties and structural reliability the papers are prepared by a line up of internationally known researchers and are reviewed by qualified scientists papers

cover recent developments in essentially all measuring techniques ultrasonic electromagnetic x rays thermal acoustic emission etc and their applications to flaw detection and structural reliability

the reliability of gate oxides is becoming a critical concern as oxide thickness is scaled below 4 nm in future technology the breakdown detection algorithms in traditional reliability characterization techniques must be modified for sub 4 nm thick sio<sub>2</sub> films that exhibit excessive tunneling currents and soft breakdown it becomes essential to fully understand the physical mechanism s responsible for gate oxide wear out and breakdown if reliability projections are based on the results of highly accelerated wafer level goi tests issues relating to the reliability testing of ultra thin oxides are discussed with examples

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