

STRESS-INDUCED PHENOMENA IN METALLIZATION

Sixth International Workshop on Stress-Induced
Phenomena in Metallization

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Stress Induced Phenomena In Metallization

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Stress Induced Phenomena In Metallization:

Stress-Induced Phenomena in Metallization P. S. Ho, 2004-12-14 Continuing the spirit of the previous workshops the proceedings contain new research results and advances in basic understanding of stress induced phenomena in metallization The current technology drive to implement low dielectric constant materials into copper metallization has brought new and significant challenges in process integration and reliability Stresses arising in metallizations and surrounding dielectric structures due to thermal mismatch electromigration microstructure changes or process integration can lead to damage and failure of interconnect structures Understanding stress related phenomena in new materials and structures becomes critical for reliability improvement and metallization development This is reflected in the papers included in the proceedings which report results on electromigration thermal stresses and void formation in copper low k interconnect structures The book also includes new results on fracture of low k dielectric structures an important research area for reliability and integration of copper metallization

Stress Induced Phenomena in Metallization Shefford P. Baker, 2002-04-09 Tiny metal structures less than a millionth of a meter across are critical building blocks in a number of high tech devices such as computer chips These metallizations are subjected to extreme conditions of temperature electric current density and mechanical load which may cause the device they are in to fail This book contains research papers on these metallizations and on the reliability problems associated with them The papers were peer reviewed for these proceedings

Stress-Induced Phenomena in Metallization Paul S. Ho, Shefford P. Baker, Tomoji Nakamura, Cynthia A. Volkert, 2004-12-14 These proceedings contain new research results and advances in basic understanding of stress induced phenomena in metallization Papers cover results on electromigration thermal stresses and void formation in copper low k interconnect structures

Stress-Induced Phenomena in Metallization, 1992

Stress-Induced Phenomena in Metallization Paul S. Ho, Shinichi Ogawa, Ehrenfried Zschech, 2009-07-02 This symposium focuses on new developments in the fields of experimental and theoretical nuclear physics including nuclear dynamics nuclear structure including hypernuclei nuclear matter nuclear astrophysics applications The participants also reported on the innovative instrumentation including future large scale facility both in Japan and Italy that will be essential for future studies

Stress-Induced Phenomena in Metallization Ehrenfried Zschech, 2006-02-16 These proceedings present current research on issues related to stress induced phenomena in on chip metal interconnects and solder joints The volume will appeal to scientists engineers graduate students interested in research and development of microelectronic devices as well as technology integration and semiconductor industry professionals and equipment suppliers

Stress-induced Phenomena in Metallization American Institute of Physics, 1992

Thirty-fourth International Symposium for Testing and Failure Analysis ASM International, 2008-01-01

Stress-Induced Phenomena in Metallization Paul S. Ho, John Bravman, Che-Yu Li, John Sanchez, 1998-04-15

Annotation Proceedings of the June 1995 workshop reporting on new and basic results in electromigration and stress induced

void formation Sections on stress characteristics and void formation in thin films and interconnects and electromigration and damage mechanisms in interconnects contain research in areas such as stresses in passivated gold and metal lines electrical measurement of stress induced void growth modeling electromigration in multi level interconnects comparison of electromigration in submicron Al Cu and Cu thin film lines and resistance oscillations induced by DC electromigration No index Annotation c by Book News Inc Portland Or *Stress-induced Phenomena in Metallization* Paul S. Ho,1996

Stress-Induced Phenomena in Metallization Shinichi Ogawa,Paul S. Ho,Ehrenfried Zschech,2007-11-13 Kyoto Japan 4 7 April 2007 Stress-Induced Phenomena in Metallization Ehrenfried Zschech,Shinichi Ogawa,Paul S. Ho,2010-12-20

One current challenge to micro and nanoelectronics is the understanding of stress related phenomena in metallization Stresses arising in on chip and 3D metal interconnects and in the surrounding materials due to thermal mismatch microstructure changes or process integration as well as electromigration can lead to degradation and failure of microelectronic products The implementation of low dielectric constant materials into the inlaid copper backend of line process has brought new challenges for process integration and reliability Understanding stress related phenomena in new materials used for 3D integration and packaging particularly using through silicon vias and microbumps is critical for future microelectronic products The Proceedings summarize new research results and advances in basic understanding of stress induced phenomena in metallization In addition to experimental studies modelling and simulation capabilities are demonstrated to evaluate the effect of stress on product performance and reliability Stress related phenomena in 3D IC interconnects are covered too Electromigration in Thin Films and Electronic Devices Choong-Un Kim,2011-08-28 Understanding and limiting electromigration in thin films is essential to the continued development of advanced copper interconnects for integrated circuits Electromigration in thin films and electronic devices provides an up to date review of key topics in this commercially important area Part one consists of three introductory chapters covering modelling of electromigration phenomena modelling electromigration using the peridynamics approach and simulation and x ray microbeam studies of electromigration Part two deals with electromigration issues in copper interconnects including x ray microbeam analysis voiding microstructural evolution and electromigration failure Finally part three covers electromigration in solder with chapters discussing topics such as electromigration induced microstructural evolution and electromigration in flip chip solder joints With its distinguished editor and international team of contributors Electromigration in thin films and electronic devices is an essential reference for materials scientists and engineers in the microelectronics packaging and interconnects industries as well as all those with an academic research interest in the field Provides up to date coverage of the continued development of advanced copper interconnects for integrated circuits Comprehensively reviews modelling of electromigration phenomena modelling electromigration using the peridynamics approach and simulation and x ray microbeam studies of electromigration Deals with electromigration issues in copper interconnects including x ray microbeam

analysis voiding microstructural evolution and electromigration failure **Reliability Wearout Mechanisms in Advanced CMOS Technologies** Alvin W. Strong, Ernest Y. Wu, Rolf-Peter Vollertsen, Jordi Sune, Giuseppe La Rosa, Timothy D. Sullivan, Stewart E. Rauch, III, 2009-10-13 This invaluable resource tells the complete story of failure mechanisms from basic concepts to the tools necessary to conduct reliability tests and analyze the results Both a text and a reference work for this important area of semiconductor technology it assumes no reliability education or experience It also offers the first reference book with all relevant physics equations and step by step procedures for CMOS technology reliability in one place Practical appendices provide basic experimental procedures that include experiment design performing stressing in the laboratory data analysis reliability projections and interpreting projections The Foundations of Vacuum Coating Technology Donald M. Mattox, D. M. Mattox, 2003-04-16 The Foundations of Vacuum Coating Technology is a concise review of the developments that have led to the wide variety of applications of this technology This book is a must have for materials scientists and engineers working with vacuum coating in the invention of new technologies or applications in all industries With over 370 references this is an excellent starting point for those who don't want to reinvent the wheel In particular the book is a valuable reference for those interested in researching proposed or existing patents This unique book provides a starting point for more in depth surveys of past and recent work in all aspects of vacuum coating The author uses his extensive knowledge of the subject to draw comparisons and place the information into the proper context This is particularly important for the patent literature where the terminology does not always match industry jargon A section of acronyms for vacuum coating and glossary of terms at the end of the book are critical additions to the information every reader needs

Handbook of Physical Vapor Deposition (PVD) Processing D. M. Mattox, 2014-09-19 This book covers all aspects of physical vapor deposition PVD process technology from the characterizing and preparing the substrate material through deposition processing and film characterization to post deposition processing The emphasis of the book is on the aspects of the process flow that are critical to economical deposition of films that can meet the required performance specifications The book covers subjects seldom treated in the literature substrate characterization adhesion cleaning and the processing The book also covers the widely discussed subjects of vacuum technology and the fundamentals of individual deposition processes However the author uniquely relates these topics to the practical issues that arise in PVD processing such as contamination control and film growth effects which are also rarely discussed in the literature In bringing these subjects together in one book the reader can understand the interrelationship between various aspects of the film deposition processing and the resulting film properties The author draws upon his long experience with developing PVD processes and troubleshooting the processes in the manufacturing environment to provide useful hints for not only avoiding problems but also for solving problems when they arise He uses actual experiences called war stories to emphasize certain points Special formatting of the text allows a reader who is already knowledgeable in the subject to scan through a section and find discussions that are of

particular interest The author has tried to make the subject index as useful as possible so that the reader can rapidly go to sections of particular interest Extensive references allow the reader to pursue subjects in greater detail if desired The book is intended to be both an introduction for those who are new to the field and a valuable resource to those already in the field The discussion of transferring technology between R D and manufacturing provided in Appendix 1 will be of special interest to the manager or engineer responsible for moving a PVD product and process from R D into production Appendix 2 has an extensive listing of periodical publications and professional societies that relate to PVD processing The extensive Glossary of Terms and Acronyms provided in Appendix 3 will be of particular use to students and to those not fully conversant with the terminology of PVD processing or with the English language

Electromigration in ULSI Interconnections Cher Ming Tan, 2010 Electromigration in ULSI Interconnections provides a comprehensive description of the electro migration in integrated circuits It is intended for both beginner and advanced readers on electro migration in ULSI interconnections It begins with the basic knowledge required for a detailed study on electro migration and examines the various interconnected systems and their evolution employed in integrated circuit technology The subsequent chapters provide a detailed description of the physics of electro migration in both Al and Cu based Interconnections in the form of theoretical experimental and numerical modeling studies The differences in the electro migration of Al and Cu based interconnections and the corresponding underlying physical mechanisms for these differences are explained The test structures testing methodology failure analysis methodology and statistical analysis of the test data for the experimental studies on electro migration are presented in a concise and rigorous manner Methods of numerical modeling for the interconnect electro migration and their applications to the understanding of electro migration physics are described in detail with the aspects of material properties interconnection design and interconnect process parameters on the electro migration performances of interconnects in ULSI further elaborated upon Finally the extension of the studies to narrow interconnections is introduced and future challenges on the study of electro migration are outlined and discussed *ULSI Science and Technology/1997*

Hisham Z. Massoud, 1997 **Copper Interconnect Technology** Tapan Gupta, 2010-01-22 Since overall circuit performance has depended primarily on transistor properties previous efforts to enhance circuit and system speed were focused on transistors as well During the last decade however the parasitic resistance capacitance and inductance associated with interconnections began to influence circuit performance and will be the primary factors in the evolution of nanoscale ULSI technology Because metallic conductivity and resistance to electromigration of bulk copper Cu are better than aluminum use of copper and low k materials is now prevalent in the international microelectronics industry As the feature size of the Cu lines forming interconnects is scaled resistivity of the lines increases At the same time electromigration and stress induced voids due to increased current density become significant reliability issues Although copper low k technology has become fairly mature there is no single book available on the promise and challenges of these next generation technologies In this

book a leader in the field describes advanced laser systems with lower radiation wavelengths photolithography materials and mathematical modeling approaches to address the challenges of Cu interconnect technology **Proceedings of the Symposium on Reliability of Metals in Electronics** Hazara S. Rathore,1995

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