

M. R. Oliver (Ed.)

Chemical-Mechanical Planarization of Semiconductor Materials



Springer

Chemical Mechanical Planarization Of Semiconductor Materials

M. R. Oliver

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Chemical Mechanical Planarization Of Semiconductor Materials:

Chemical-Mechanical Planarization of Semiconductor Materials M.R. Oliver, 2004-01-26 This book contains a comprehensive review of CMP Chemical Mechanical Planarization technology one of the most exciting areas in the field of semiconductor technology It contains detailed discussions of all aspects of the technology for both dielectrics and metals The state of polishing models and their relation to experimental results are covered Polishing tools and consumables are also covered The leading edge issues of damascene and new dielectrics as well as slurryless technology are discussed

Chemical-Mechanical Planarization of Semiconductor Materials M. R. Oliver, 2014-01-15 *Chemical-Mechanical Planarization of Semiconductor Materials* M.R. Oliver, 2013-03-14 Chemical Mechanical Planarization CMP has emerged in the last two decades and grown rapidly as a basic technology widely used in semiconductor device fabrication As a semiconductor processing step it was developed at IBM in the mid 1980s From this beginning the technology has been widely adopted throughout the semiconductor industry As basic CMP technology has been understood and accepted throughout the semiconductor industry its uses in different parts of the semiconductor process have multiplied This includes special steps for some special processing flows such as for DRAM technology In addition the availability of CMP technology has enabled the implementation of new technologies with the best example being copper interconnect technology Copper could not be practically implemented into semiconductor process flows until the advent of CMP Unfortunately the rapid acceptance and implementation of CMP technology in wafer fabrication has occurred without a corresponding rate of advance in the underlying science Progress is being made in understanding the underlying CMP mechanisms but in general it is slow and uneven The most noteworthy exception to this trend is the science of metal CMP reactions where the scientific understanding is actually driving much of the advance of the technology There has been no corresponding progress in other CMP areas however

Microelectronic Applications of Chemical Mechanical Planarization Yuzhuo Li, 2007-10-19 An authoritative systematic and comprehensive description of current CMP technology Chemical Mechanical Planarization CMP provides the greatest degree of planarization of any known technique The current standard for integrated circuit IC planarization CMP is playing an increasingly important role in other related applications such as microelectromechanical systems MEMS and computer hard drive manufacturing This reference focuses on the chemical aspects of the technology and includes contributions from the foremost experts on specific applications After a detailed overview of the fundamentals and basic science of CMP Microelectronic Applications of Chemical Mechanical Planarization Provides in depth coverage of a wide range of state of the art technologies and applications Presents information on new designs capabilities and emerging technologies including topics like CMP with nanomaterials and 3D chips Discusses different types of CMP tools pads for IC CMP modeling and the applicability of tribometry to various aspects of CMP Covers nanotopography CMP performance and defect profiles CMP waste treatment and the chemistry and colloidal properties of the slurries used in CMP Provides a

perspective on the opportunities and challenges of the next fifteen years Complete with case studies this is a valuable hands on resource for professionals including process engineers equipment engineers formulation chemists IC manufacturers and others With systematic organization and questions at the end of each chapter to facilitate learning it is an ideal introduction to CMP and an excellent text for students in advanced graduate courses that cover CMP or related semiconductor manufacturing processes

Advances in Chemical Mechanical Planarization (CMP) Babu Suryadevara, 2021-09-10 Advances in Chemical Mechanical Planarization CMP Second Edition provides the latest information on a mainstream process that is critical for high volume high yield semiconductor manufacturing and even more so as device dimensions continue to shrink The second edition includes the recent advances of CMP and its emerging materials methods and applications including coverage of post CMP cleaning challenges and tribology of CMP This important book offers a systematic review of fundamentals and advances in the area Part one covers CMP of dielectric and metal films with chapters focusing on the use of current and emerging techniques and processes and on CMP of various materials including ultra low k materials and high mobility channel materials and ending with a chapter reviewing the environmental impacts of CMP processes New content addressed includes CMP challenges with tungsten cobalt and ruthenium as interconnect and barrier films consumables for ultralow topography and CMP for memory devices Part two addresses consumables and process control for improved CMP and includes chapters on CMP pads diamond disc pad conditioning the use of FTIR spectroscopy for characterization of surface processes and approaches for defection characterization mitigation and reduction Advances in Chemical Mechanical Planarization CMP Second Edition is an invaluable resource and key reference for materials scientists and engineers in academia and R D Reviews the most relevant techniques and processes for CMP of dielectric and metal films Includes chapters devoted to CMP for current and emerging materials Addresses consumables and process control for improved CMP including post CMP

Micromanufacturing Processes V.K. Jain, 2016-04-19 Increased demand for and developments in micromanufacturing have created a need for a resource that covers both the science and technology of this rapidly growing area With contributions from eminent professors and researchers actively engaged in teaching research and development Micromanufacturing Processes details the basic principles tools

Handbook of Semiconductor Manufacturing Technology Yoshio Nishi, Robert Doering, 2017-12-19 Retaining the comprehensive and in depth approach that cemented the bestselling first edition s place as a standard reference in the field the Handbook of Semiconductor Manufacturing Technology Second Edition features new and updated material that keeps it at the vanguard of today s most dynamic and rapidly growing field Iconic experts Robert Doering and Yoshio Nishi have again assembled a team of the world s leading specialists in every area of semiconductor manufacturing to provide the most reliable authoritative and industry leading information available Stay Current with the Latest Technologies In addition to updates to nearly every existing chapter this edition features five entirely new contributions on Silicon on insulator SOI materials and devices Supercritical CO₂ in semiconductor cleaning Low

dielectrics Atomic layer deposition Damascene copper electroplating Effects of terrestrial radiation on integrated circuits ICs Reflecting rapid progress in many areas several chapters were heavily revised and updated and in some cases rewritten to reflect rapid advances in such areas as interconnect technologies gate dielectrics photomask fabrication IC packaging and 300 mm wafer fabrication While no book can be up to the minute with the advances in the semiconductor field the Handbook of Semiconductor Manufacturing Technology keeps the most important data methods tools and techniques close at hand

Chemical Mechanical Polishing 9 G. Banerjee,K. Sundaram,V. Desai,Y. Obeng,2008-05 The papers included in this issue of ECS Transactions were originally presented in the symposium Chemical Mechanical Polishing 9 held during the 213th meeting of The Electrochemical Society in Phoenix Arizona from May 18 23 2008 Mechanics of Composite and Multi-functional Materials, Volume 5 Raman Singh,Geoffrey Slipper,2025-08-07 Mechanics of Composite Hybrid and Multifunctional Materials Volume 5 of the Proceedings of the 2019 SEM Annual Conference Exposition on Experimental and Applied Mechanics the fifth volume of six from the Conference brings together contributions to this important area of research and engineering The collection presents early findings and case studies on a wide range of areas including Recycled Constituent Composites Damage Detection Advanced Imaging of Composites Multifunctional Materials Composite Interfaces Tunable Composites **Research on Chemical Mechanical Polishing Mechanism of Novel Diffusion Barrier Ru for Cu Interconnect** Jie Cheng,2017-09-06 This thesis addresses selected unsolved problems in the chemical mechanical polishing process CMP for integrated circuits using ruthenium Ru as a novel barrier layer material Pursuing a systematic approach to resolve the remaining critical issues in the CMP it first investigates the tribocorrosion properties and the material removal mechanisms of copper Cu and Ru in KIO₄ based slurry The thesis subsequently studies Cu Ru galvanic corrosion from a new micro and in situ perspective and on this basis seeks ways to mitigate corrosion using different slurry additives The findings presented here constitute a significant advance in fundamental and technical investigations into the CMP while also laying the groundwork for future research

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