Copper In Organic Acid Based Cleaning Solutions

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Handbook of Copper Compounds and Applications

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TIMOTHY SWANSON

Bulletin Chiral Lewis Acids in Organic Synthesis
Scientific notes and summaries of investigations in geology, hydrology, and related fields.
Geological Survey Professional Paper Krieger Publishing Company
Emphasizing the utility of copper-related compounds, this text illustrates the numerous current and potential uses from agricultural bactericides and wood preservatives to colourants and solar cells. It discusses the properties and behaviour of the copper ion, copper compounds' employment in organic polymerization and isomerization reactions, the e
Official Gazette of the United States Patent Office ASM International
A Companion to Seals in the Middle Ages is a cross-disciplinary collection of fourteen essays on medieval sigillography. It is organized thematically, and it emphasizes important, often cutting-edge, methodologies for the study of medieval seals and sealing cultures.
Oxalic Acid Based Chemical Systems for Electrochemical Mechanical Planarization of Copper CRC Press
Copper and its alloys have been utilized for more than 10,000 years. Today, copper is one of the most commonly used metals in the world; 24 million tons are consumed worldwide. A wide variety of copper alloys are used in a range of applications. As well as good mechanical properties, the excellent electrical conductivity and thermal conduction are reasons copper alloys are deployed in many industrial fields. Copper plays a role in electronic and electrical applications and all forms of heat transfer. In automobiles as well as in houses copper could not be replaced. In the sanitary industry copper and brass are well established, for example, drinking water pipes have been used for decades without problems. While the corrosion resistance of copper and its alloys is excellent in unpolluted air and drinking water, corrosion rates in impure environments can be much higher and lead to severe material damage. Corrosion is a system property, so it is important to find the right copper material with regard to the environmental conditions it will be exposed to. This handbook highlights the limitations of the use of copper and its alloys in various corrosive solutions and provides vital information on corrosion protection measures.
A Companion to Seals in the Middle Ages National Academies Press
La microélectronique est un monde complexe dans lequel plusieurs sciences comme la physique, l'électronique, l'optique ou la mécanique, contribuent à créer des nano-objets fonctionnels. La chimie est particulièrement impliquée dans de nombreux domaines tels que la synthèse des matériaux, la pureté des fluides, des gaz, des sels, le suivi des réactions chimiques et de leurs équilibres ainsi que la préparation de surfaces optimisées et la gravure sélective de couches spécifiques. Au cours des dernières décennies, la taille des transistors s'est considérablement réduite et la fonctionnalité des circuits électroniques s'est accrue. Cette évolution a conduit à une interpénétration de la chimie et de la microélectronique exposée dans cet ouvrage. Chimie en microélectronique présente les chimies et les séquences utilisées lors des procédés de production de la microélectronique, des nettoyages jusqu'aux gravures des plaquettes de silicium, du rôle et de l'impact de leur niveau de pureté jusqu'aux procédés d'interconnexion des millions de transistors composant un circuit électronique. Afin d'illustrer la convergence avec le domaine de la santé, l'ouvrage expose les nouvelles fonctionnalisations spécifiques, tels que les capteurs biologiques ou les capteurs sur la personne.
Proceedings of the First International Conference on Combinatorial and Optimization, ICCAP 2021,

December 7-8 2021, Chennai, India The Electrochemical Society
This proceeding constitutes the thoroughly refereed proceedings of the 1st International Conference on Combinatorial and Optimization, ICCAP 2021, December 7-8, 2021. This event was organized by the group of Professors in Chennai. The Conference aims to provide the opportunities for informal conversations, have proven to be of great interest to other scientists and analysts employing these mathematical sciences in their professional work in business, industry, and government. The Conference continues to promote better understanding of the roles of modern applied mathematics, combinatorics, and computer science to acquaint the investigator in each of these areas with the various techniques and algorithms which are available to assist in his or her research. We selected 257 papers were carefully reviewed and selected from 741 submissions. The presentations covered multiple research fields like Computer Science, Artificial Intelligence, internet technology, smart health care etc., brought the discussion on how to shape optimization methods around human and social needs.
Joining John Wiley & Sons
Copper-based multi-level metallization systems in today's ultralarge-scale integrated electronic circuits require the fabrication of diffusion barriers and conductive seed layers for the electrochemical metal deposition. Such films of only several nanometers in thickness have to be deposited void-free and conformal in patterned dielectrics. The envisaged further reduction of the geometric dimensions of the interconnect system calls for coating techniques that circumvent the drawbacks of the well-established physical vapor deposition. The atomic layer deposition method (ALD) allows depositing films on the nanometer scale conformally both on three-dimensional objects as well as on large-area substrates. The present work therefore is concerned with the development of an ALD process to grow copper oxide films based on the metal-organic precursor bis(tri-n- butylphosphane)copper(I)acetylacetonate [(nBu3P)2Cu(acac)]. This liquid, non-fluorinated & beta;-diketonate is brought to react with a mixture of water vapor and oxygen at temperatures from 100 to 160°C. Typical ALD-like growth behavior arises between 100 and 130°C, depending on the respective substrate used. On tantalum nitride and silicon dioxide substrates, smooth films and self-saturating film growth, typical for ALD, are obtained. On ruthenium substrates, positive deposition results are obtained as well. However, a considerable intermixing of the ALD copper oxide with the underlying films takes place. Tantalum substrates lead to a fast self-decomposition of the copper precursor. As a consequence, isolated nuclei or larger particles are always obtained together with continuous films. The copper oxide films grown by ALD can be reduced to copper by vapor-phase processes. If formic acid is used as the reducing agent, these processes can already be carried out at similar temperatures as the ALD, so that agglomeration of the films is largely avoided. Also for an integration with.
Microelectronic Applications of Chemical Mechanical Planarization BRILL
The safety of the nation's drinking water must be maintained to ensure the health of the public. The U.S. Environmental Protection Agency (EPA) is responsible for regulating the levels of substances in the drinking water supply. Copper can leach into drinking water from the pipes in the distribution system, and the allowable levels are regulated by the EPA. The regulation of copper, however, is complicated by the fact that it is both necessary to the normal functioning of the body and toxic to the body at too high a level. The National Research Council was requested to form a committee to review the scientific validity of the EPA's maximum contaminant level goal for copper in drinking water. Copper in Drinking Water outlines the findings of the committee's review. The book provides a review of the toxicity of copper as well as a discussion of the essential nature of this metal. The risks posed by both short-term and long-term exposure to copper are characterized, and the implications for public health are discussed. This book is a valuable reference for individuals involved in the regulation of water supplies and individuals interested in issues surrounding this metal.
Handbook of Lapping and Polishing Lavoisier
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 tribometrology 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.
Cases Decided in United States Court of Customs and Patent Appeals CRC Press
The focus of Handbook for Cleaning/Decontamination of Surfaces lies on cleaning and decontamination of surfaces and solid matter, hard as well as soft. Bringing together in a 2-volume reference source: - current knowledge of the physico-chemical fundamentals underlying the cleaning process; - the different needs for cleaning and how these needs are met by various types of cleaning processes and cleaning agents, including novel approaches; - how to test that cleaning has taken place and to what extent; - the effects of cleaning on the environment; - future trends in cleaning and decontamination, for example the idea of changing surfaces, to hinder the absorbance of dirt and thus make cleaning easier. A brief introduction is given to the legal demands concerning the environment and a historical background, in terms of development of detergents, from soaps to the modern sophisticated formulations. Bactericides, their use and the environmental demands on them are covered. Thorough discussions of mechanisms for cleaning are given in several chapters, both general basic concepts and special cases like particle cleaning and cleaning using microemulsion concepts. * General understanding of how cleaning works, function of ingredients and formulations * Overview of environmental issues and demands from the society in the area * Gives basic formulas for cleaning preparations in most areas
ICCAP 2021 European Alliance for Innovation
Microelectronics is a complex world where many sciences need to collaborate to create nano-objects: we need expertise in electronics, microelectronics, physics, optics and mechanics also crossing into chemistry, electrochemistry, as well as biology, biochemistry and medicine. Chemistry is involved in many fields from materials, chemicals, gases, liquids or salts, the basics of reactions and equilibrium, to the optimized cleaning of surfaces and selective etching of specific layers. In addition, over recent decades, the size of the transistors has been drastically reduced while the functionality of circuits has increased. This book consists of five chapters covering the chemicals and sequences used in processing, from cleaning to etching, the role and impact of their purity, along with the materials used in “Front End Of the Line” which corresponds to the heart and performance of individual transistors, then moving on to the “Back End Of the Line” which is related to the interconnection of all the transistors. Finally, the need for specific functionalization also requires key knowledge on surface treatments and chemical management to allow new applications. Contents 1. Chemistry in the “Front End of the Line” (FEOL): Deposits, Gate Stacks, Epitaxy and Contacts, François Martin, Jean-Michel Hartmann, Véronique Carron and Yannick Le Tiec. 2. Chemistry in Interconnects, Vincent Jousseaume, Paul-Henri Haumesser, Carole Pernel, Jeffery Butterbaugh, Sylvain Maîtrejean and Didier Louis. 3. The Chemistry of Wet Surface Preparation: Cleaning, Etching and Drying, Yannick Le Tiec and Martin Knotter. 4. The Use and Management of Chemical Fluids in Microelectronics, Christiane Gottschalk, Kevin Mclaughlin, Julie Cren, Catherine Peyne and Patrick Valenti. 5. Surface Functionalization for Micro- and Nanosystems: Application to Biosensors, Antoine Hoang, Gilles Marchand, Guillaume Nonglaton, Isabelle Texier-Nogues and Francoise Vinet. About the Authors Yannick Le Tiec is a technical expert at CEA-Leti, Minatec since 2002. He is a CEA-Leti assignee at IBM, Albany (NY) to develop the advanced 14 nm CMOS node and the FDSOI technology. He held different technical positions from the advanced 300 mm SOI CMOS pilot line to different assignments within SOITEC for advanced wafer development and later within INES to optimize solar cell ramp-up and yield. He has been part of the ITRS Front End technical working group at ITRS since 2008.
Galvanic Corrosion Properties of Titanium in Organic Acids John Wiley & Sons
Chiral Lewis Acids in Organic SynthesisJohn Wiley & Sons
The Effects of Copper Applied to Organic Soil Alone and in Association with Manganese and Zinc, on Composition of Crops and Reactions in the Soil Elsevier
Lapping and polishing are currently the most precise surface finishing processes for mechanical and electronic components. Unfortunately, most improvements in either methods or understanding of the physical processes involved are closely guarded as proprietary information. The Handbook of Lapping and Polishing is the first source in English to bring to the light of day the physical fundamentals and advanced technologies at the leading edge of modern lapping and polishing practice. Collecting decisive work contributed by industrial and academic experts from the USA, Germany, and Japan, this authoritative resource presents the latest lapping and polishing technologies along with case studies that illustrate their value. After a brief introduction, the book explains the fundamental concepts and major types of lapping and polishing processes. The discussion then turns to lapping of ductile and brittle materials followed by an in-depth look at lapping machines and equipment. Rounding out the presentation, the final chapters discuss polishing technologies and equipment as well as the latest on chemical-mechanical polishing (CMP) and its applications in the semiconductor industry. Offering an integrated approach to both theory and practical applications under a single cover, the Handbook of Lapping and Polishing supplies a definitive survey of the most advanced surface finishing technologies available.
The Effect of Methods and Rates of Application of Two Copper Carriers on the Yield and Copper Content of Spinach and Sudan Grass Grown in the Greenhouse on Two Organic Soils Wiley-VCH
Advances in Chemical Mechanical Planarization (CMP) 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 technology has grown to encompass the removal and planarization of multiple metal and dielectric materials and layers both at the device and the metallization levels, using different tools and parameters, requiring improvements in the control of topography and defects. 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 particular techniques and processes, and on CMP of particular various materials, including ultra low-k materials and high-mobility channel materials, and ending with a chapter reviewing the environmental impacts of CMP processes. Part Two addresses consumables and process control for improved CMP, and includes chapters on the preparation and characterization of slurry, diamond disc pad conditioning, the use of FTIR spectroscopy for characterization of surface processes, and approaches for defection characterization, mitigation, and reduction. Considers techniques and processes for CMP of dielectric and metal films Includes chapters devoted to CMP for particular materials Addresses consumables and process control for improved CMP
The Dissociation Pressures of Certain Pyridine Copper Organic Acid Compounds Woodhead Publishing
In an ECMP process, a wafer is anodically baised during polishing. The electrical potential is the driving force to oxidize copper metal to ions. Copper ions then react with chemistry in the electrolyte to go in solution or form a passivation layer on the surface. The passivation layer is removed by a very low downforce (0.5-1 psi), causing copper to electrochemically dissolve in solution. Passive film formation during copper ECMP is key to the success of this process, since passivation reduces dissolution in the recessed areas, while elevations on the copper surface in direct contact with the ECMP pad are electrochemically planarized. If no passive film forms, then copper removal will be conformal from the elevated and recessed areas, and planarity will be lost. Chemical formulations for the electrochemical mechanical planarization (ECMP) of copper must contain constituents that are stable at anodic potentials. A key component of the formulation is a corrosion inhibitor, which is required to protect low lying areas while higher areas are selectively removed. Organic compounds, which adsorb on copper at low overpotentials and form a film by oxidation at higher overpotentials, may be particularly useful for ECMP. The main goal of the research reported in this dissertation is to understand and develop oxalic acid-based chemical systems suitable for ECMP of copper through electrochemical and surface investigations. Special attention was paid to the development of an inhibitor, which can function under applied potential conditions. Physical methods such as profilometry and four point probe were used to obtain copper removal rates. An organic compound, thiosalicylic acid (TSA), was identified and tested as a potential corrosion inhibitor for copper. TSA offers better protection than the conventionally used benzotriazole (BTA) by oxidizing at high anodic potentials to form a passive film on the copper surface. The passive film formed on the copper surface by addition of TSA was characterized by X-ray photoelectron spectroscopy. The oxidation potential of TSA was characterized using cyclic

voltammetry. The passivation and repassivation kinetics was investigated in detail and a passivation mechanism of copper in oxalic acid in the presence of TSA is proposed. Copper removal experiments were performed on a specially designed electrochemical abrasion cell (EC-AC) in both the presence and absence of inhibitors. The effect of anodic potentials on the dissolution of copper was studied to identify suitable conditions for the electro-chemical mechanical planarization process.

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The Chemist John Wiley & Sons
A complete overview covering the application of metal-based chiral Lewis acids from all parts of the periodic table, the Author emphasizes the most recent contributions to the field as well as prominent direction of development. The book discusses the design of chiral complexes as well as a wide spectrum of reactions promoted by various chiral Lewis acids, including water-compatible acids as well as the most important applications in the chemical and pharmaceutical industries. A must-have for catalytic and organic chemists working in the field, both in academia and industry, as well as pharmaceutical and medicinal chemists.

Citric Acid Enhancement of Copper Sulfate Toxicity to Blue-green Algae and Other Nuisance Organisms
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Organic Reagents for Copper