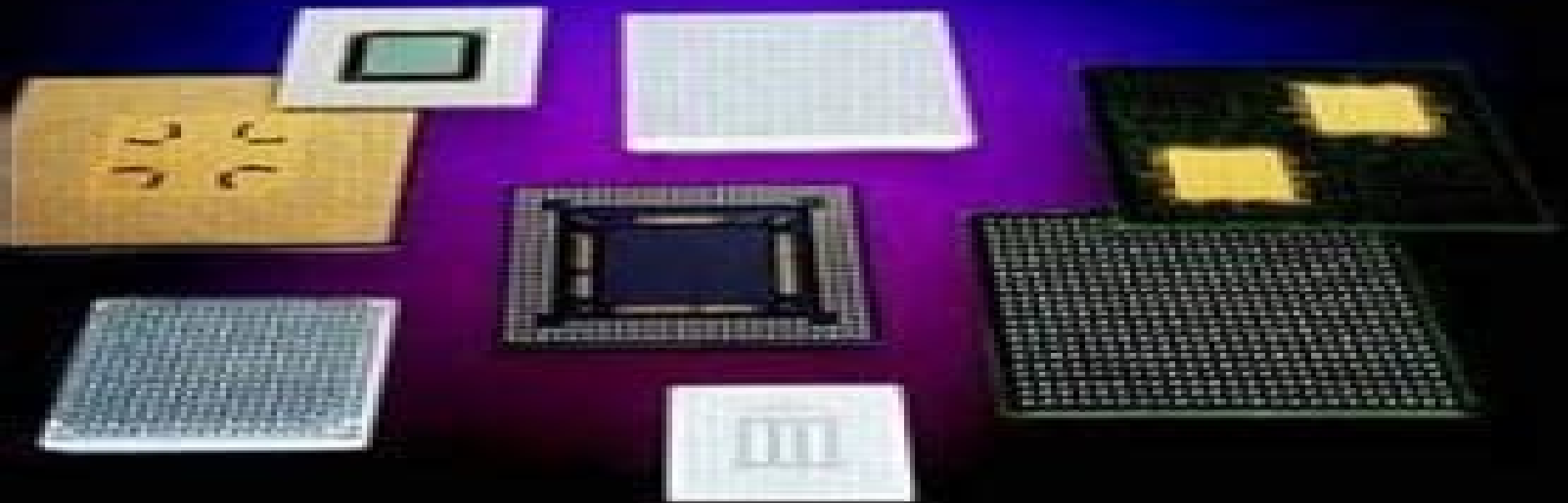


JENNIE S. HWANG, PH.D.



# Modern Solder Technology for Competitive Electronics Manufacturing

# Modern Solder Technology For Competitive Electronics Manufacturing

**John H. Lau, Ning-Cheng Lee**



## **Modern Solder Technology For Competitive Electronics Manufacturing:**

**Modern Solder Technology for Competitive Electronics Manufacturing** Jennie S. Hwang, 1996 Introduction Advanced Surface Mount Technology and Die Attach Techniques Solder Material Soldering Chemistry Solderability Microstructure of Solders Aqueous Cleaning Manufacture No Clean Manufacture Protective and Reactive Atmosphere Soldering Surface Mount Fine Pitch Technology Surface Mount BGA PAC Technology Soldering Methodology and Equipment Soldering and Soldering Related Issues Strengthened Solders Lead Free Solders Solder Joint Failure Mode Solder Joint Failure Assessment Case Studies Solder Joint Quality and Reliability New and Emerging Specifications and Standards Future Trends

**Electrochemical Technology Applications in Electronics** Lubomyr Taras Romankiw, 2000 The symposium was jointly held by the US and Japanese societies but drew participants from companies universities and research institutes in 12 countries The 47 papers cover high density packaging and related technologies electronic devices and related materials and processes micro electromechanical systems and microfabrication magnetic materials and devices and fundamental studies on the materials for electrochemical technology applications Nearly half of them 23 were invited Annotation copyrighted by Book News Inc Portland OR *Handbook of Lead-Free Solder Technology for Microelectronic Assemblies* Karl J. Puttlitz, Kathleen A. Stalter, 2004-02-27 This reference provides a complete discussion of the conversion from standard lead tin to lead free solder microelectronic assemblies for low end and high end applications Written by more than 45 world class researchers and practitioners the book discusses general reliability issues concerning microelectronic assemblies as well as factors specific *Morphological Evolution of Electrodeposits and Electrochemical Processing in ULSI Fabrication and Electrodeposition of and on Semiconductors IV* Kazuo Kondo, 2005 Papers in this volume are from the 199th ECS Meeting held in Washington DC Spring 2001 Morphology evolution encompasses electrochemical processing in ULSI fabrication shape evolution growth habit and microstructure of electrodeposits The most prominent example at present is the electrochemical deposition of copper for ULSI interconnects Many other electrochemical processes at various stages of emergence and development hold promise for the electronics industry and beyond

**Area Array Packaging Handbook** Ken Gilleo, 2002 Covers design packaging construction assembly and application of all three approaches to Area Array Packaging Ball Grid Array BGA Chip Scale Package CSP and Flip Chip FC Details the pros and cons of each technology with varying applications Examines packaging ramifications of high density interconnects HDI

Assembly and Reliability of Lead-Free Solder Joints John H. Lau, Ning-Cheng Lee, 2020-05-29 This book focuses on the assembly and reliability of lead free solder joints Both the principles and engineering practice are addressed with more weight placed on the latter This is achieved by providing in depth studies on a number of major topics such as solder joints in conventional and advanced packaging components commonly used lead free materials soldering processes advanced specialty flux designs characterization of lead free solder joints reliability testing and data analyses design for reliability and failure analyses for

lead free solder joints Uniquely the content not only addresses electronic manufacturing services EMS on the second level interconnects but also packaging assembly on the first level interconnects and the semiconductor back end on the 3D IC integration interconnects Thus the book offers an indispensable resource for the complete food chain of electronics products

*Microelectronic Packaging* M. Datta,Tetsuya Osaka,J. Walter Schultze,2004-12-20 Microelectronic Packaging analyzes the massive impact of electrochemical technologies on various levels of microelectronic packaging Traditionally interconnections within a chip were considered outside the realm of packaging technologies but this book emphasizes the importance of chip wiring as a key aspect of microelectronic packaging and focuses on electrochemical processing as an enabler of advanced chip metallization Divided into five parts the book begins by outlining the basics of electrochemical processing defining the microelectronic packaging hierarchy and emphasizing the impact of electrochemical technology on packaging The second part discusses chip metallization topics including the development of robust barrier layers and alternative metallization materials Part III explores key aspects of chip package interconnect technologies followed by Part IV s analysis of packages boards and connectors which covers materials development technology trends in ceramic packages and multi chip modules and electroplated contact materials Illustrating the importance of processing tools in enabling technology development the book concludes with chapters on chemical mechanical planarization electroplating and wet etching cleaning tools Experts from industry universities and national laboratories submitted reviews on each of these subjects capturing the technological advances made in each area A detailed examination of how packaging responds to the challenges of Moore s law this book serves as a timely and valuable reference for microelectronic packaging and processing professionals and other industrial technologists     **Principles of Soldering** Giles Humpston,David M. Jacobson,2004

*Reliability and Failure of Electronic Materials and Devices* Milton Ohring,Lucian Kasprzak,2014-10-14 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      **The Road to Scientific Success** Deborah D. L. Chung, 2006 The Hungarian born mathematical genius John von Neumann was undoubtedly one of the greatest and most influential scientific minds of the 20th century Von Neumann made fundamental contributions to Computing and he had a keen interest in Dynamical Systems specifically Hydrodynamic Turbulence This book offering a state of the art collection of papers in computational dynamical systems is dedicated to the memory of von Neumann Including contributions from J E Marsden P J Holmes M Shub A Iserles M Dellnitz and J Guckenheimer this book offers a unique combination of theoretical and applied research in areas such as geometric integration neural networks linear programming dynamical astronomy chemical reaction models structural and fluid mechanics

**Electrical Contacts** Milenko Braunovic, Nikolai K. Myshkin, Valery V. Konchits, 2017-12-19 Various factors affect the performance of electrical contacts including tribological mechanical electrical and materials aspects Although these behaviors have been studied for many years they are not widely used or understood in practice Combining approaches used across the globe Electrical Contacts Fundamentals Applications and Technology integrates advances in research and development in the tribological material and analytical aspects of electrical contacts with new data on electrical current transfer at the micro and nanoscales Taking an application oriented approach the authors illustrate how material characteristics tribological behavior and loading impact the degradation of contacts formation of intermetallics and overall reliability and performance Coverage is divided broadly into three sections with the first focused on mechanics tribology materials current and heat transfer and basic reliability issues of electrical contacts The next section explores applications such as power connections electronic connections and sliding contacts while the final section presents the diagnostic and monitoring techniques used to investigate and measure phenomena occurring at electrical contact interfaces Numerous references to current literature reflect the fact that this book is the most comprehensive survey in the field Explore an impressive collection of data theory and practical applications in Electrical Contacts Fundamentals Applications and Technology a critical tool for anyone investigating or designing electrical equipment with improved performance and reliability in mind

**Lead-free Electronics** Sanka Ganesan, Michael G. Pecht, 2006-02-17 Lead free Electronics provides guidance on the design and use of lead free electronics as well as technical and legislative perspectives All the complex challenges confronting the electronics industry are skillfully addressed Complying with state legislation Implementing the transition to lead free electronics including anticipating associated costs and potential supply chain issues Understanding intellectual property issues in lead free alloys and their applications including licensing and infringement Implementing cost effective manufacturing and testing Reducing risks due to tin whiskers Finding lead free solutions in harsh environments such as in the automotive and telecommunications industries Understanding the capabilities and limitations of conductive adhesives in lead free interconnects Devising solutions for lead free flip chip interconnects in high performance integrated circuit products Each chapter is written by leading experts in the field and carefully edited to ensure a consistent approach

Readers will find all the latest information including the most recent data on cyclic thermomechanical deformation properties of lead free SnAgCu alloys and a comparison of the properties of standard Sn Pb versus lead free alloys using the energy partitioning approach With legislative and market pressure to eliminate the use of lead in electronics manufacturing this timely publication is essential reading for all engineers and professionals in the electronics industry **Electronics**

**Manufacturing : with Lead-Free, Halogen-Free, and Conductive-Adhesive Materials** John Lau,C.P. Wong,Ning-Cheng Lee,Ricky Lee,2002-08-23 An engineer s guidebook demonstrating non toxic electronics manufacturing processes **A Guide to Lead-free Solders** John W. Evans,2007-01-05 The book is important because it reflects a trend especially in microelectronics manufacture toward recyclability Europe and Asia are moving towards legislation to ban the use of lead in solders and public demand in the US will likely have the same result Producers of solders and manufacturers who use them will have to invent and employ suitable substitutes and A Guide to Lead free Solders will show them how to do so

**Microjoining and Nanojoining** Y N Zhou,2008-03-27 Many important advances in technology have been associated with nanotechnology and the miniaturization of components devices and systems Microjoining has been closely associated with the evolution of microelectronic packaging but actually covers a much broader area and is essential for manufacturing many electronic precision and medical products Part one reviews the basics of microjoining including solid state bonding and fusion microwelding Part two covers microjoining and nanojoining processes such as bonding mechanisms and metallurgy process development and optimization thermal stresses and distortion positioning and fixturing sensing and numerical modelling Part three discusses microjoining of materials such as plastics ceramics metals and advanced materials such as shape memory alloys and nanomaterials The book also discusses applications of microjoining such as joining superconductors the manufacture of medical devices and the sealing of solid oxide fuel cells This book provides a comprehensive overview of the fundamental aspects of microjoining processes and techniques It is a valuable reference for production engineers designers and researchers using or studying microjoining technologies in such industries as microelectronics and biomedical engineering Reviews the basics of nanojoining including solid state bonding and fusion microwelding Covers microjoining and nanojoining processes such as bonding mechanisms and metallurgy sensing and numerical modelling Examines applications of microjoining such as the manufacturing of medical devices and the sealing of solid oxide fuel cells **Road**

**To Scientific Success, The: Inspiring Life Stories Of Prominent Researchers (Volume 1)** Deborah D L Chung,2006-03-20 This is the inaugural volume of a new book series entitled The Road to Scientific Success Inspiring Life Stories of Prominent Researchers Authoritative scientists such as Nobel Prize laureates Douglas D Osheroff and Herbert A Hauptman and US National Medal of Science recipients Paul Ching Wu Chu and Eli Ruckenstein describe their life experiences in relation to how success was attained how their careers were developed how their research was steered how priorities were set and how difficulties were faced These keys to success serve as a useful guide for anyone who is looking for

advice on how to direct their career and conduct scientific research that will make an impact The focus on the road to success rather than scientific findings and on personal experience aims to inspire and encourage readers to achieve greater success themselves The objectives of this book series are To motivate young people to pursue their vocations with rigor perseverance and direction To inspire students to pursue science or engineering To enhance the scientific knowledge of students including those that do not major in science or engineering To help parents and teachers prepare the next generation of scientists or engineers To increase the awareness of the general public to the advances of science To provide a record of the history of science

### **Multidisciplinary Know-How for Smart-Textiles Developers** Tünde

Kirstein,2013-04-04 Smart textiles developers draw on diverse fields of knowledge to produce unique materials with enhanced properties and vast potential Several disciplines outside the traditional textile area are involved in the construction of these smart textiles and each individual field has its own language specific terms and approaches Multidisciplinary know how for smart textiles developers provides a filtered knowledge of these areas of expertise explaining key expressions and demonstrating their relevance to the smart textiles field Following an introduction to the new enabling technologies commercialisation and market trends that make up the future of smart textiles development part one reviews materials employed in the production of smart textiles Types and processing of electro conductive and semiconducting materials optical fibres for smart photonic textiles conductive nanofibres and nanocoatings polymer based resistive sensors and soft capacitance fibres for touch sensitive smart textiles are all discussed Part two then investigates such technologies as the embedding of electronic functions the integration of thin film electronics and the development of organic and large area electronic OLAE technologies for smart textiles Joining technologies are also discussed alongside kinetic thermoelectric and solar energy harvesting technologies and signal processing technologies for activity aware smart textiles Finally product development and applications are the focus of part three which investigates strategies for technology management innovation and improved sustainability before the book concludes by exploring medical automotive and architectural applications of smart textiles With its distinguished editor and international team of expert contributors Multidisciplinary know how for smart textiles developers is a key tool for readers working in industries including design fashion textiles through to electronics computing and material science It also provides a useful guide to the subject for academics working across a wide range of fields Reviews materials used in the production of smart textiles Examines the technologies used in smart textiles such as optical fibres and polymer based resistive sensors Investigates strategies for technology management innovation and improved development

### **Soldering** Mel Schwartz,2014-03-01

Covers various soldering methods and techniques as well as the latest on solder alloys solder films surface preparation fluxes and cleaning methods heating methods inspection techniques and quality control and reliability Geared to scientists material engineers designers manufacturing engineers and technologists who need immediate practical guidance rather than theoretical instruction

*Joining of Materials and Structures* Robert W. Messler, 2004-08-05 *Joining of Materials and Structures* is the first and only complete and highly readable treatment of the options for joining conventional materials and the structures they comprise in conventional and unconventional ways and for joining emerging materials and structures in novel ways. Joining by mechanical fasteners, integral designed or formed in features, adhesives, welding, brazing, soldering, thermal spraying, and hybrid processes are addressed as processes and technologies as are issues associated with the joining of metals, ceramics, including cement and concrete, glass, plastics, and composites, including wood, as well as for the first time anywhere, living tissue. While focused on materials issues, issues related to joint design, production, processing, quality assurance, process economics, and joint performance in service are not ignored. The book is written for engineers from an in-training student to a seasoned practitioner by an engineer who chose to teach after years of practice. By reading and referring to this book, the solutions to joining problems will be within one's grasp.

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*Area Array Packaging Materials* Ken Gilleo, 2004 This engineering reference covers the most important assembly processes in modern electronic packaging.



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