Electronics Manufacturing: with Lead-Free, Halogen-Free, and Conductive-Adhesive Materials (Pro Engineering)

John H. Lau, C.P. Wong, Ning-Cheng Lee, Ricky S.W. Lee
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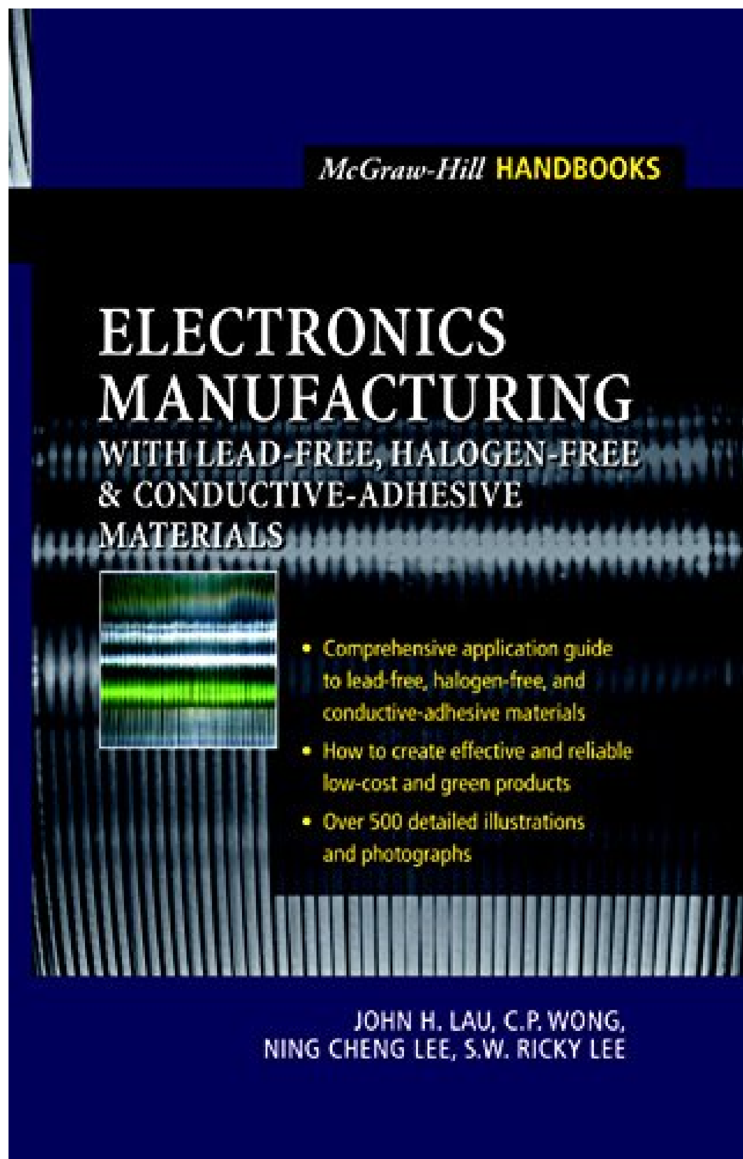

#1172032 in eBooks 2002-09-13 2002-09-13File Name: B00KTSA7VK | File size: 38.Mb

John H. Lau, C.P. Wong, Ning-Cheng Lee, Ricky S.W. Lee : Electronics Manufacturing: with Lead-Free, Halogen-Free, and Conductive-Adhesive Materials (Pro Engineering) before purchasing it in order to gage whether or not it would be worth my time, and all praised Electronics Manufacturing: with Lead-Free, Halogen-Free, and Conductive-Adhesive Materials (Pro Engineering):

4 of 6 people found the following review helpful. Outstanding book in electronics manufacturingBy Bill CollierThis is a very special book!The focus of this book is on leadfree soldering: from chip-level interconnects, IC packaging, printed circuit board (PCB) fabrication, to PCB assemblies. It provides many useful information and engineering data related to leadfree soldering. These include: design, material selection, process development, equipment selection, manufacturing, and reliability of leadfree soldering. I found these information very useful for my job as an RD engineer.This book is very unique!Even it's focus is on leadfree sodering, however, this book talks about the major problems created by leadfree soldering. These include halogen-free molding compounds for plastic packages and halogen-free epoxy resins for PCBs. This information helps me to design my electronic and photonic products so they can withstand the leadfree soldering environments.This book is wonderful!One of the alternatives to leadfree soldering is to use conductive adhesives. This book talks about this very important subject in great details. I enjoy very much in reading the technical contents underlining this technology.Overall, this is a great book! I would like to recommend to everyone who is working in electronic and optoelectronic products. Hats off to the authors for writing such a comprehensive handbook on leadfree soldering. Congratulations!3 of 5 people found the following review helpful. Just a nice Handbook on Leadfree SolderingBy Bill CollierI like this book very much! This is the most comprehensive Handbook to leadfree soldering I have ever seen. I learned a lot from this book and it is very useful for my jobs. I carry it with me when I am at work. I open this book when I have problems, and it can always help me find the solutions. I recommend this book to all the manufacturing engineers and managers who are designing and making electronics products.

ELECTRONICS MANUFACTUIRNG WITH LEAD-FREE, HALOGEN-FREE, AND CONDUCTIVE-ADHESTIVE MATERIALS This comprehensive guide provides cutting edge information on lead-free, halogen-free, and conductive-adhesive technologies and their application to low-cost, high-density, reliable, and green products. Essential for electronics manufacturing and packaging professionals who wish to master lead-free, halogen-free, and conductive-adhesive problem solving methods, and those demanding cost-effective designs and high-yield environmental benign manufacturing processes, this valuable reference covers all aspects of this fast-growing field. Written for design, materials, process, equipment, manufacturing, reliability, component, packaging, and system engineers, and technical and marketing managers in electronics and photonics packaging and interconnection, this book teaches a practical understanding of the cost, design, materials, process, equipment, manufacturing, and reliability issues of lead-free, halogen-free, and conductive-adhesive technologies. Among the topics explored: * Chip (wafer) level interconnects with lead-free solder bumps* Lead-free solder wafer bumping with micro-ball mounting and paste printing methods* Lead-free solder joint reliability of WLCSPs on organic and ceramic substrates* Chip (wafer) level interconnects with solderless bumps such as Ni-Au, Au, and Cu, Cu wires, Au wires, Au studs, and Cu studs* Design, materials, process, and reliability of WLCSPs with solderless interconnects on PCB/substrate* Halogen-free molding compounds for PQFP, PBGA, and MAP-PBGA packages* Environmentally benign die-attach films for PQFP and PBGA packages and lead-free die-attach bonding techniques for IC packaging* Environmental issues for conventional PCBs and substrates* Some environmentally conscious flame-retardants for PCBs and organic substrates* Emerging technologies for fabricating environmental friendly PCBs such as design for environment, green PCB manufacturing, and environmental safety* Lead-free soldering activities such as legislation, consortia programs, and regional preferences on lead-free solder alternatives* Criteria, development approaches, and varieties of alloys and properties of lead-free solders* Physical, mechanical, chemical, electrical, and soldering properties of lead-free solders* Manufacturing process and performance of lead-free surface finishes for both PCB and component applications* Implementation and execution challenges of lead-free soldering, especially for the reflow and wave soldering process* Fundamental understanding of electrically conductive adhesive (ECA) technology* Effects of lubricant removal and cure shrinkage on ECAs* Mechanisms underlying the contact resistance shifts of ECAs* Effects of electrolytes and moisture absorption on contact resistance shifts of ECAs* Stabilization of contact resistance of ECAs using various additives

"An excellent book in Flip Chip Technologies, March 2, 2000 er: David Young from Boston, MA I bought this book at NEPCON West on February 29 and read it on my way home to Boston. I like it very much! This book covers all the important subjects (many of those I am not aware of) on low-cost flip chip Technologies. Also, for each subject, useful data, technical know-how, and engineering analyses are presented. I strongly recommend it to everyone who is working in electronic packaging and interconnections. I am sure you will find it useful! Online reader review of Lau's Low Cost Flip Chip TechnologiesFrom the Back Cover ELECTRONICS MANUFACTUIRNG WITH LEAD-FREE, HALOGEN-FREE, AND CONDUCTIVE-ADHESTIVE MATERIALS This comprehensive guide provides cutting edge information on lead-free, halogen-free, and conductive-adhesive technologies and their application to low-cost, high-density, reliable, and green products. Essential for electronics manufacturing and packaging professionals who wish to master lead-free, halogen-free, and conductive-adhesive problem solving methods, and those demanding cost-effective designs and high-yield environmental benign manufacturing processes, this valuable reference covers all

aspects of this fast-growing field. Written for design, materials, process, equipment, manufacturing, reliability, component, packaging, and system engineers, and technical and marketing managers in electronics and photonics packaging and interconnection, this book teaches a practical understanding of the cost, design, materials, process, equipment, manufacturing, and reliability issues of lead-free, halogen-free, and conductive-adhesive technologies. Among the topics explored: * Chip (wafer) level interconnects with lead-free solder bumps * Lead-free solder wafer bumping with micro-ball mounting and paste printing methods * Lead-free solder joint reliability of WLCSPs on organic and ceramic substrates * Chip (wafer) level interconnects with solderless bumps such as Ni-Au, Au, and Cu, Cu wires, Au wires, Au studs, and Cu studs * Design, materials, process, and reliability of WLCSPs with solderless interconnects on PCB/substrate * Halogen-free molding compounds for PQFP, PBGA, and MAP-PBGA packages * Environmentally benign die-attach films for PQFP and PBGA packages and lead-free die-attach bonding techniques for IC packaging * Environmental issues for conventional PCBs and substrates * Some environmentally conscious flame-retardants for PCBs and organic substrates * Emerging technologies for fabricating environmental friendly PCBs such as design for environment, green PCB manufacturing, and environmental safety * Lead-free soldering activities such as legislation, consortia programs, and regional preferences on lead-free solder alternatives * Criteria, development approaches, and varieties of alloys and properties of lead-free solders * Physical, mechanical, chemical, electrical, and soldering properties of lead-free solders * Manufacturing process and performance of lead-free surface finishes for both PCB and component applications * Implementation and execution challenges of lead-free soldering, especially for the reflow and wave soldering process * Fundamental understanding of electrically conductive adhesive (ECA) technology * Effects of lubricant removal and cure shrinkage on ECAs * Mechanisms underlying the contact resistance shifts of ECAs * Effects of electrolytes and moisture absorption on contact resistance shifts of ECAs * Stabilization of contact resistance of ECAs using various additivesAbout the AuthorJohn H. Lau received his PhD in theoretical and applied mechanics from the University of Illinois, an MASc in structural engineering from the University of British Columbia, a second MS in engineering physics from the University of Wisconsin, and a third MS in management science from Fairleigh Dickinson University. He also has a BE in civil engineering from National Taiwan University. John is an interconnection technology scientist at Agilent Technologies, Inc. His current interests cover a broad range of optoelectronic packaging and manufacturing technology. Prior to coming to Agilent, Lau worked for Express Packaging Systems, Hewlett-Packard, Sandia National Laboratory, Bechtel Power Corporation, and Exxon Production and Research Company. With more than 30 years of RD and manufacturing experience in the electronics, photonics, petroleum, nuclear, and defense industries, he has given over 200 workshops and invited presentations, authored and coauthored over 200 peer-reviewed technical publications, authored more than 100 book chapters, and is the author and editor of 14 books on IC packaging. Lau has served on the editorial boards of IEEE Transactions on Components, Packaging and Manufacturing Technology, and ASME Transactions, Journal of Electronic Packaging. He also has served as general chairman, program chairman, session chairman, and invited speaker at several ASME, IEEE, ASM, MRS, IMAPS, SEMI, and SMI International conferences. He has received many awards from the ASME and IEEE for best proceedings and transactions papers and outstanding technical achievements and is one of the distinguished lecturers of the ASME and IEEE/CPMT. He is an ASME Fellow and IEEE Fellow and is listed in American Men and Women of Science and Who's Who in America. C.P. Wong is a Regent's Professor at the School of Materials Science and Engineering and a Research Director at the NSF Packaging Research Center at the Georgia Institute of Technology. He received his BS in chemistry from Purdue University, and his PhD in chemistry from Pennsylvania State University with Nobel Laureate Professor Henry Taube. Wong spent 19 years at ATT Bell Labs and was elected a Bell Labs Fellow in 1992. His research interests lie in the fields of polymeric materials, reaction mechanism, IC encapsulation, hermetic equivalent plastic packaging, electronic packaging processes, interfacial adhesions, PWB, SMT assembly, and component reliability. He has received many awards, among which are the ATT Bell Laboratories Distinguished Technical Staff Award (1987), the ATT Bell Labs Fellow Award (1992), the IEEE Components, Packaging and Manufacturing Technology (CPMT) Society Outstanding and Best Paper Awards (1990, 1994, 1996, 1998, and 2002), the IEEE Technical Activities Board (TAB) Distinguished Award (1994), the IEEE CMPT Society's Outstanding Sustained Technical Contribution Award (1995), the Georgia Tech Outstanding Faculty Research Program Development Award (1999) and many others. Wong was elected a member of the National Academy of Engineering in 2000, and he is a Fellow of the IEEE, AIC, and ATT Bell Labs. He served as technical vice president (1990 and 1991) and president (1992 and 1993) of the IEEE-CPMT Society, the IEEE TAB Management Committee (1993 to 1994), and chair of IEEE TAB Design and Manufacturing Committee (1994 to 1996), the IEEE Nomination and Appointment Committee (1998 to 1999), and the IEEE Fellow Committee (2001-present). Ning-Cheng Lee is the vice president of technology of Indium Corporation of America. He has been with Indium since 1986. Prior to joining Indium, he was with Wright Patterson Air Force Base Materials Laboratory (1981 to 1982), Morton Chemical (1982 to 1984), and SCM (1984 to 1986). He has more than 18 years of experience in the development of fluxes and solder pastes for SMT industries. In addition, he also has very extensive experience in the development of high-temperature polymers, encapsulants for microelectronics, underfills, and adhesives. His current research interests cover advanced materials for interconnects and packaging for electronics and

optoelectronics applications, with emphasis on both high performance and low cost of ownership. Lee received his PhD in polymer science and structure-property relationships from the University of Akron in 1981. He also studied organic chemistry at Rutgers University in 1976 and received a BS in chemistry from National Taiwan University in 1973. Lee is the author and coauthor of several books on electronic packaging technologies. He received two awards from SMTA and one from SMT magazine for best proceedings papers of international conferences. He also served on the editorial advistory boards of Soldering and Surface Mount Technology and Global SMT and Packaging. He has been published in numerous publications and frequently gives presentations, invited seminars, keynote speeches, and short courses worldwide at many international conferences or symposiums. Shi-Wei Ricky Lee received his BS in mechanical engineering from National Taiwan University in 1981. After two years of military service, he joined the Yue Loong Motor Engineering Center as structural testing engineer. In 1986, he went to the United States for postgraduate studies, receiving an MS in engineering mechanics from Virginia Polytechnic Institute State University in 1987 and a PhD in aeronautics and astronautics from Purdue University in 1992. Through years of intensive research, he has developed expertise in computational modeling and experimental methods. Before taking a teaching position at the Hong Kong University of Science Technology (HKUST) in 1993, he spent one year at Purdue University as postdoctoral research associate and visiting assistant professor. Currently, Lee is associate professor of mechanical engineering and director of EPACK Lab at HKUST. He is an associate editor of IEEE Transactions on Components and Packaging Technologies and also sits on the editorial advisory boards of two international journals: Soldering and Surface Mount Technology and Smart Materials and Structures. In 1997 to 1998, he served as guest editor for Smart Materials and Structures, and published a special issue on piezoelectric motors/actuators and their applications. Lee is very active in professional societies. He is a member of Tau Beta Pi, the ASME, IMAPS, and a senior member of the IEEE. He was the vice-chair of the Hong Kong Section of ASME International (1997 to 1998) and is chair of the Hong Kong Chapter of the IEEE-CPMT Society (2001 to 2002). He is also a member of the executive committee of the Electronic and Photonic Packaging Division of the ASME. Lee has served as track organizer and session chair for many interntional conferences and sits on the program committee (interconnections) of the Electronic Components and Technology Conference. Furthermore, he is quite keen on continuing education for professional development. He has organized several workshops and short courses, and has been invited to deliver short courses and seminars around the world. Lee's recent research activities cover flip chip and CSP technologies, wafer-level packaging, high-density interconnects, and mechanics for sensors and actuators. He has published numerous technical papers in international journals and conference proceedings, and is the coauthor of three books. He is a two-time recipient of the JEP Best Paper Award (2000 and 2001), conferred by ASME Transactions: Journal of Electronic Packaging, and owns one U.S. patent.