News Release

Dr. Jennie Hwang to address "*Preventing Manufacturing Defects and Product Failure*" and "*Reliability of Electronics - the Role of Intermetallic Compounds*" at IPC APEX on Monday, January 24, 2022, from 8:00AM to 11:00AM and from 3:30PM to 6:30PM, respectively.

Under today's manufacturing and market environment, the effort to maximize production yield, reduce cost and assure product reliability is becoming increasingly critical to a company's competitiveness. Considering the new and anticipated developments in packaging and assembly and with the goal of achieving high yield and reliability in mind, the "how-to" prevent prevailing production defects and product reliability issues through an understanding of potential causes is a necessity.

Dr Hwang leverages decades of extensive real-world experiences and deep and comprehensive knowledge to address "*Preventing Manufacturing Defects and Product Failure*" (**PDC17**) on Monday, January 24 from 8:00AM to 11:00AM; and "*Reliability of Electronics - the Role of Intermetallic Compounds*" (**PDC27**) on Monday, January 24 from 3:30PM to 6:30PM at IPC APEX be held at the San Diego Conference Center.

Mon, Jan 24, 2022 - 8:00 AM to 11:00 AM

PDC17: Preventing Manufacturing Defects and Product Failure

Focusing on preventing prevailing production defects and product reliability issues that affect yield, cost and performance through an understanding of potential causes and plausible solutions, PDC17 provides a holistic overview of product reliability - the roles of materials, processes, testing/service conditions, and crucial principles behind the product reliability.

One selected area related to product failure (tin whisker) and five selected defects (PCB pad cratering vs. pad lifting, BGA head-on-pillow, open or insufficient solder joints, copper dissolution issue and lead-free through-hole barrel filling) will be discussed. Specific defects associated with the reliability of BTC, PoP and BGA assembly will be highlighted. The root causes and preventive measures for each of the five prevalent production defects will be outlined. From practical perspectives, tin whisker with emphasis on risk mitigation through understanding the factors that affect tin whisker growth, and its testing challenges will be outlined. The practical tin whisker criteria for reliability implications in the lead-free environment and the relative effectiveness of mitigating measures will be ranked.

The course addresses the most prevalent production issues and defects that affect yield, cost and reliability, suitable to all who are involved with or interested in SnPb and Pb-free manufacturing including designers, engineers, researchers, managers and business decision makers; also, is designed for those who desire the broad-based information. Please join your industry colleagues in this course. The main topics to be covered in this course are listed below. And attendees' questions and comments are warmly welcomed.

Main Topics:

- Premise of production defects and product failure prevention;
- Common production defects and issues;
- PCB pad cratering (vs. pad lifting);
- Open or insufficient solder Joints;
- BGA head-on-pillow defect;
- Copper dissolution;

- Lead-free through-hole barrel filling;
- Defects of BTC and PoP solder joints - prevention and remedies;
- Tin whisker - concerns, practical criteria, testing challenges; growth phenomena;
- Tin whisker - contributing factors, risk mitigation, practical remedies;
- Summary

Registration: https://n1b.goexposoftware.com/events/ipc22/goExpo/user/listSeminars.php?ci=17

Info: ToyaRichardson@ipc.org

Mon, Jan 24, 2022 - 3:30 PM to 6:30 PM

PDC27: Reliability of Electronics - Role of Intermetallic Compounds

Intermetallic compounds (IMCs) play an increasingly important role to the performance and reliability of solder interconnections in the chip level, package level and board level of lead-free electronics.

With the goal to produce reliable products while achieving high yield production, this course focuses on one of likely product failure processes that are induced or aggravated by time, temperature and/or stress - intermetallic compounds.

PDC27 covers the relevant and important aspects of intermetallic compounds ranging from scientific fundamentals to practical application scenarios. Intermetallic compounds before solder joint formation, during solder joint formation and after solder joint formation in storage and during service will be examined. Intermetallics at-interface and in-bulk, as well as the role of PCB surface finish/component coating in relation to intermetallics, in turn, to reliability will be discussed. The difference between SnPb and Pb-free solder joint in terms of intermetallic compounds, which affects production-floor phenomena and the eventual field failure, will be outlined. The course will also address the relevant aspects of "newer" Pb-free alloys that were recently introduced to the market. The course emphasizes on practical, working knowledge, yet balanced and substantiated by science. Attendees are welcome to bring their own selected systems for deliberation.

Please join your industry colleagues in this course.

Main Topics:

- Intermetallic compounds " definition, fundamentals, characteristics
- Phase diagrams of Pb-free solders in contrast with SnPb
- Intermetallic compounds in the intrinsic material- Pb-free vs. SnPb
- Formation and growth during production process and during product service life
- Intermetallic compounds - at-interface vs. in-bulk
- Effects from substrate compositions (hybrid module thick film pads, PCB surface finish, component surface coating)
- Gold embrittlement
- Different types of intermetallic compounds " effects on solder joint reliability (Ni/Au, Ni/Pd/Au, Ni/Pd, Cu)
- SAC alloys incorporated with various doping elements " characteristics, performance
- "Low-Temperature" solder alloys " critical areas to product reliability
- Effects on failure mode

• Effects on reliability.
Registration: https://n1b.goexposoftware.com/events/ipc22/goExpo/user/listSeminars.php?ci=27
Info: ToyaRichardson@ipc.org

About the Speaker:

Dr. Hwang, a pioneer and long-standing leader in lead-free electronics, brings her decades SMT manufacturing experience coupled with her sustained 25+ years lead-free R&D and hands-on production implementation to the courses. She has been a major contributor to the implementation of Surface Mount manufacturing since its inception through hands-on production and as an advisor to OEMs, EMS and U.S. Dept. of Defense. She has provided solutions to many challenging problems, ranging from production yield to field failure diagnosis to most challenging reliability issues. Her work covers both commercial and military applications.

Her long list of clients ranges from many Fortune 100 companies to private boutique manufacturers. Her recent assignment has led her client to achieve a higher than 99.9% production first-pass yield from below 50%. She has also solved the reportedly toughest reliability issues in high reliability products, as well as eliminated production defects for low-cost consumer products through process optimization and materials improvements.

Dr. Hwang's SMT manufacturing experiences and problem-solving track record culminate in the publication of the very first book on the subject of '*SMT Solder Paste – Technology and Application*", and the books entitled: "*Modern Solder Technology for Competitive Electronics Manufacturing*" and *"IC Ball Grid Array & Fine Pitch Peripheral Interconnections.*" Her sustained leadership in lead-free R&D and hands-on production implementation are reflected in her authoring the groundbreaking books on the subject of lead-free technology and manufacturing, entitled: "*Environment-Friendly Electronics—Lead Free Technology*" and "*Implementation of Lead-free electronics manufacturing"* respectively.

She holds patents and has 650+ publications to her credit, including the sole authorship of several internationally-used textbooks. Her books, columns, and publications have been widely cited worldwide. Dr. Hwang has been a frequent keynote/featured speaker at worldwide events (United States Patent and Trademark Office, Federal Women's Program, university commencement speech, numerous industry events). Over the years, she has lectured to hundreds of thousands of professionals and researchers in professional development courses. As a columnist for the SMT magazine for the last 30+ years, she addresses the current issues, providing solutions and worldviews.

Additionally, she has served on the Board of NYSE Fortune 500 companies and on various civic, government and university boards and committees, including U.S. Commerce Dept. - Export Council; U.S. Defense Dept. - Globalization Committee, Forecasting Future Disruptive Technologies Committee, U.S. Army Research Panel; Board of Army Science and Technology, and the National Materials and Manufacturing Board. She has chaired the National Institute of Standards and Technology (NIST) – EEEL and the Assessment Board of Army Engineering Centers. Currently she serves as Chair of the National Laboratory Assessment Board and the Army Research Laboratory Technical Assessment Board. She is a reviewer of various government programs and is prolific writer and speaker on the topics of trade, business, education and social agenda.

Among her many awards and honors are citations of recognition and achievement by the U.S. Congress, Honorary Doctoral degree, induction into Women in Technology International Hall of Fame, named "R&D Star-to-Watch" (*Industry Week)*; YWCA Women of Achievement Award; election to the National Academy of Engineering. She was featured as one of the ten luminaries in the inaugural volume: "*Road to Scientific Success - Inspiring Life Stories of Prominent Researchers*", published by World Scientific Publications.

Her formal education includes four academic degrees (Ph.D. M.S., M.S., B.S. in Materials Science and Engineering, Physical Chemistry, Liquid Crystals Science, Chemistry, respectively), Harvard Business School Executive Program and Columbia University Business School Corporate Governance program. She has held various senior executive positions with Lockheed Martin Corp., Hanson PLC

(SCM Corp,) Sherwin Williams Co, and CEO of International Electronic Materials Corp. She is currently a principal of H-Technologies Group, providing business, technology and manufacturing solutions. She is also an invited distinguished adj. Professor of Engineering School of Case Western Reserve University, and serves on the University's Board of Trustees.

She has established endowment funds at her alma maters, dedicating to interdisciplinary education and to acquiring global exposures. The Dr. Jennie S. Hwang YWCA award, now for 20 years running, is established in her honor, recognizing outstanding women students pursuing a STEM discipline.

Her books and publications are well received worldwide, which have been the widely adopted textbooks throughout the global industry for more than three decades.

- (ISBN-0-07-143048-2) "*Lead-free Implementation: A Guide to Manufacturing*" McGraw-Hill, New York, 2005;
- (ISBN: 9780901150400) "*Environment-Friendly Electronics—Lead Free Technology*", Electrochemical Publications, LTD, Great Britain, 2001;
- (ISBN-0-07-031749-3) "*Modern Solder Technology for Competitive Electronics Manufacturing*", McGraw-Hill, New York, 1996;
- (ISBN-0-90-115029-0*)"IC Ball Grid Array & Fine Pitch Peripheral Interconnections*", Electrochemical Publications, LTD, Great Britain, 1995;
- In Japanese, "*Solder Paste: Technology and Applications for Surface Mount, Hybrid Circuits, and IC Component Manufacturing*", Industrial Research, Japan 1990;
- (ISBN-0442-2075-49) "*Solder Paste: Technology and Applications for Surface Mount, Hybrid Circuits, and IC Component Manufacturing*", Van Nostrand Reinhold, New York, 1988, currently by Springer Science & Business Media, LLC. http://www.springer.com/us/book/9789401160520

###

H-Technologies Group
Office@H-TechGroup.com