21st April 2021 (Wednesday) / 2021年4月21日（星期三）

(CE21-TC1) Technology Conference / 高科技技术研讨会

Conference Chairman / 会议主席：

Wisdom Qu 瞿燕红
Area Technical Manager for Eastern China of Indium Corporation(Suzhou)Co., Ltd.
铟泰公司华东区域技术经理

Venue / 地点	Room No.6, B2, Shanghai World Expo Exhibition & Convention Center 上海世博展览馆地下二层6号会议室	
Time / 时间	Topic / 主题	Speaker / 主讲人
10:45 - 11:20	Versatile TIM Solution With Chain Network Solder Composit 链状网格焊接复合材料提供的多功能热界面解决方案 (CE21-TC1.1)	Dr. Sophia Bu 卜秀丽博士 Indium Corporation 铟泰公司
11:20 - 11:55	Micro-Solutions: Solving One Challenge At A Time 微方案：一次解决一个挑战 (CE21-TC1.2)	Yunliang Du 杜运亮 Mentor, A Siemens Business
11:55 - 12:30	High-Reliability, Fourth Generation Low-Temperature Solders: Improving Drop Shock Performance 高可靠性第四代低温焊料：提高跌落抗冲击性能 (CE21-TC1.3)	William Yu 余瑜 MacDermid Alpha Electronics Solutions 麦德美爱法
12:30 - 13:45	Lunch Break / 午餐	
13:45 – 14:20	An Alternative Lead-Free Low-Temperature Solder With Excellent Drop Shock Resistance 一种抗跌落性能优异的无铅低温焊料 (CE21-TC1.4)	Anson Yu 虞沈捷 Indium Corporation 铟泰公司
14:20 - 14:55	Investigation On the Failure Mechanism of Electrochemical Migration of Printed Circuit Board Under The Soluble Salts In Dust 尘土中可溶性盐作用下的电路板电化学迁移失效机理研究 (CE21-TC1.5)	Dr. Yilin Zhou 周怡琳博士 School of Artificial Intelligence Beijing University Posts and Telecommunications 北京邮电大学人工智能学院
14:55 – 15:30	Accelerating Continuous Improvement With Next Generation pH Neutral Cleaning Products 新一代pH中性清洗剂推动清洗工艺持续改进 (CE21-TC1.6)	Jerry Ji 纪建光 ZESTRON North Asia ZESTRON北亚分公司

All papers will be presented in Chinese 所有演讲者都将使用中文

22nd April 2021 (Thursday) / 2021年4月22日（星期四）

(CE21-TC2) Technology Conference / 高科技技术研讨会

Conference Chairman / 会议主席：

Lin Dong 董林
Member of SMTA China Technical Advisory Committee / 中国SMTA技术顾问委员会委员
Senior Technical Program Manager of Salcomp Co., Ltd. / 赛尔康技术有限公司高级技术项目经理

Venue / 地点	Room No.6, B2, Shanghai World Expo Exhibition & Convention Center 上海世博展览馆地下二层6号会议室	
Time / 时间	Topic / 主题	Speaker / 主讲人
10:45 - 11:20	Can Low Cost Silver Free Alloy Be Used In Type II & III Assemblies 低成本无银合金可用于II型和III型组装吗? (CE21-TC2.1)	William Yu 余瑜 MacDermid Alpha Electronics Solutions 麦德美爱法
11:20 - 11:55	The Relationship Between Cleanliness and Reliability/Durability 清洁度与可靠性/耐用性的关系 (CE21-TC2.2)	Daniel Gao 高伟 Shanghai KYZEN Cleaning Materials Co., Ltd. 上海凯晟清洁材料有限公司
11:55 - 12:30	Minimizing Voiding In QFN Packages Using Solder Preforms 通过预成型焊片降低QFN空洞 (CE21-TC2.3)	Leon Rao 饶乐 Indium Corporation 铟泰公司
12:30 - 13:45	Lunch Break / 午餐	
13:45 – 14:20	Weak Organic Acids-Detection and Reliability Assesment 弱有机酸-检测和可靠性评估 (CE21-TC2.4)	Dillon Zhu 朱军桦 AIM Solder
14:20 - 14:55	Can All Liquid Fluxes Work Well On OSP Pad Finish? 所有液态助焊剂都能良好地应用于回流后的OSP焊盘表面吗? (CE21-TC2.5)	William Yu 余瑜 MacDermid Alpha Electronics Solutions 麦德美爱法
14:55 – 15:30	Selective Solder Fine Pitch Components On High Thermal Mass Assembly 选择性焊接高热质量组装的细间距引脚零件 (CE21-TC2.6)	Binhua Yu 於斌华 ITW Electronics (Suzhou) Co., Ltd. 依工电子设备(苏州)有限公司

All papers will be presented in Chinese 所有演讲者都将使用中文

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Technology Conference
高科技技术研讨会

(CE21-TC1)

Versatile TIM Solution With Chain Network Solder Composit
链状网格焊接复合材料提供的多功能热界面解决方案
(CE21-TC1.1)

Dr. Sophia Bu 卜秀丽博士
Indium Corporation
铟泰公司

21 April 2021 (Wednesday)
2021年4月21日(星期三)
10:45-11:20
Room No.6, B2, Shanghai World Expo Exhibition & Convention Center
上海世博展览馆地下二层6号会议室

Abstract 文章大纲

Thermal management is always a challenge in the electronic industry. The need for faster, more powerful devices makes this challenge even harsher and more difficult to overcome, thus the need for improved high performance materials continues to grow. The solutions for thermal interface material (TIM) include thermal grease, thermal gel, phase-change material, solder preform, and liquid solder [1-3]. All of those suffer from either performance limitation such as pump-out, or building of liquid solder dam, or poor thermal conductivity. Solder paste and solder preform are thermally effective as TIM. However, the constraint is that both sides have to be solderable metallization. Consequently, the flip chip backside and the package housing or heat sink need to be plated with solderable surface finishes, such as NiAu. This inevitably increases the cost. Solder paste suffers further from flux fume and voids generated, therefore is obviously unacceptable. The voids are results of outgassing within liquid solder joints. With solder preform being a good thermal conductor, a solder preform-like material which maintains the shape of preform but forms intimate contact in-between flip chip and housing without metallization will be desired. Furthermore, the shape of preform should be maintained even at subsequent SMT assembly reflow process, similar to our earlier work [4]. If a type of filler particle with thermal conductivity better than that of solder can be incorporated in the solder paste, this TIM material will have an enhanced thermal conductivity.
A novel epoxy SAC solder paste TIM system has been developed with the use of non-volatile epoxy flux. Cu filler was added to the solder paste, with Cu volume % of metal ranged from 17 to 60 volume % of metal. Formation of semi-continuous high melting Cu chain network was achieved, with the use of CuSn IMC bridges between Cu particles. This chain network, at sufficient concentration, serves as skeleton and maintains the shape of the sandwiched solder paste layer, thus prevented further spread out and outgassing upon subsequent SMT reflow process, and also allowed formation of TIM joint even in the absence of solderable metallization on flip chip and packaging housing. Presence of significant amount of ductile solder within TIM joint promises high resistance against brittle cracking under stress. The Cu content could be further optimized between 17 and 33 volume % of metal to avoid flux bleeding and maintain good epoxy adhesion between TIM phase and parts. The 20°C thermal conductivity achieved was 6.1 W/mK, and could be up to about 13 W/mK with further epoxy flux optimization.

热管理一直是电子工业面临的一大挑战。对更快、更大功率设备的需求使得这一挑战更加严峻，更加难以克服，因此对更有效的热处理材料的需求不断增长。热界面材料(TIM)的解决方案包括：导热硅脂，导热凝胶，相变材料，预成型焊片和液体焊料[1-3]。但是这些方案都存在一些弊端，比如泵出、建立液体焊料雷达以及差的导热性能。锡膏和预成型焊片是有效的热界面材料，但是限制是两端都必须是可焊的金属层。因此，倒装芯片的背面、封装外壳或者散热器需要镀上可焊的金属层，比如NiAu。这个过程不可避免的要增加成本。锡膏的缺点是会产生助焊剂烟雾和空洞，因此不被接受。空洞是由于液体焊点内部气体溢出造成的。预成型焊片是一种很好的热导体，因此需要一种类似预成型焊片的材料—保持预成型的形状，在倒装芯片与外壳之间形成紧密的接触，同时又不需要进行表面金属化处理。并且，预成型的形状在接下来的表面贴装回流焊过程中仍要保持，可参考我们前期的一些工作[4]。如果一种导热性比焊料更好的填料粒子可以掺入到锡膏中，这种热界面材料将会有更优异的导热性能。

我们采用非挥发性的环氧助焊剂开发了一种新的环氧锡银铜锡膏TIM体系。我们在锡膏中加入了铜颗粒，铜在金属粉中体积比为17%～60%。铜颗粒之间通过CuSn界金属桥形成了半连续的高熔点铜链状网络。在接下来的表面贴装回流焊过程中，这种链状网格在浓度足够的情况下，可以作为骨架来维持夹心结构锡膏层的形状，避免了锡膏的铺展及气体的溢出，并且保证了在倒装芯片与外壳在没有可焊性金属层的情况下仍然可以形成热界面连接。热界面连接点中足够量延展性焊接材料的存在可以保证在应力作用下具有高的抗碎裂性能。铜的体积含量可以进一步优化到17%～33%，可以避免助焊剂渗出，同时又能保证各部件与热界面之间保持好的连接。20℃的导热率可以达到6.1W/mK，通过优化环氧助焊剂可以进一步提高到13w/mK。

Speaker Biography 演讲者简介

Dr. Sophia Bu received her PH in chemistry from Fudan University 2011.She has since joined Indium and work as Research Chemist. Her major research field is thermal materials and fluxes and solder pastes technology.

卜秀丽博士2011年毕业于复旦大学化学系。随后加入铟泰科技担任研发员。她的主要工作包括热处理材料和锡膏开发。

Micro-Solutions: Solving One Challenge At A Time
微方案: 一次解决一个挑战
(CE21-TC1.2)

Yunliang Du 杜运亮
Mentor, A Siemens Business

21 April 2021 (Wednesday)
2021年4月21日(星期三)
11:20-11:55
Room No.6, B2, Shanghai World Expo Exhibition & Convention Center
上海世博展览馆地下二层6号会议室

Abstract 文章大纲

The fourth industrial revolution has been around since 2015; it took some time for many industries & companies to absorb and translate the vision into actions. Digital transformation seemed as a long and vague journey for many manufacturers. The pandemic has emphasized the need for agility — leading to the conclusion that a digital transformation is a must.

The future lies in the applications layer — the micro-solutions:
1. Stand-alone SaaS applications
2. Clear and focused ROI
3. Solving a specific problem
4. Leading to operational excellence
In this session, we will deep dive into the details of micro-solutions in Electronics Manufacturing – how we identify counterfeit components and use machine-learning for advanced analytics.

第四次工业革命自2015年以来一直在推进；许多行业和公司花了一些时间来吸收并将愿景转化为行动。对于许多制造商来说，数字转型似乎是一个漫长而模糊的旅程。这普遍强调了对敏捷性的需求从而导致了数字转型是必须的结论

未来在于应用---微观解决方案
1. 独立的软件即服务应用
2. 清晰而聚焦的投资回报率
3. 解决特定问题
4. 引领卓越运营
在这个章节中，我们将深入探讨电子制造中微解决方案的细节-----我们如何识别假冒元件，以及如何使用机器学习进行高阶分析。

Speaker Biography 演讲者简介

Du Yunliang, formerly Philips Process and Equipment Management, Ericsson SMT Engineering Manager and other positions, is now Mentor Valor Product and Business Development Manager, nearly 17 years of experience in the electronic manufacturing industry.

杜运亮，曾任飞利浦工艺与设备管理，爱立信SMT工程经理等职位，现担任Mentor公司Valor产品与业务拓展经理，近17年的电子制制造行业经验业。

High-Reliability, Fourth Generation Low-Temperature Solders: Improving Drop Shock Performance
高可靠性第四代低温焊料：提高跌落抗冲击性能
(CE21-TC1.3)

William Yu 余瑜
MacDermid Alpha Electronics Solutions
麦德美爱法

21 April 2021 (Wednesday)
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Abstract 文章大纲

Ever evolving packaging and assembly requirements have been driving the design of solder alloys with higher thermal and mechanical reliability. There has always been a latent interest in low temperature solders (LTS) as they can potentially reduce material and energy costs, promote long-term reliability, and help reducing labor and equipment maintenance cost. Most recently such interest has increased exponentially, being motivated by the need of reducing dynamic warpage of ultra-thin electronic packages for markets such as mobile, computing, wearable devices, and Internet of Things.

Finding a suitable solder alloy that can be processed at lower temperatures and forms solder joints with high mechanical and thermal reliability is not an easy task. For example, a certain alloy may have higher drop shock and lower thermal cycling, while another alloy may have higher thermal cycling and lower drop shock performance. However, a fact that is rarely discussed is that heterogeneous Sn-Bi-Cu/LTS solder joints require higher processing temperature than homogeneous LTS joints to obtain comparable drop shock performance. This presentation will show how the drop shock performance of a third and fourth generations SnBi solder is affected by alloy melting behavior, processing and assembly conditions.

The two low temperature solders evaluated (Alloy 3 and Alloy 4), have between 49 and 58 wt.% Bi, and additives that result in distinct alloy microstructures. The heterogeneous solder joints are obtained by assembling CTBGA84 packages having SAC305 balls on printed circuit boards by using Alloy 3 and Alloy 4 type 4 solder pastes. These are then processed at 165oC and 175oC reflow peak temperatures, which are considerably lower than the SAC305 melting range, and evaluated for drop shock performance. The drop shock test procedure uses the voltage method, based on JESD22-B111 (Nov. 2016) and IPC/JEDEC 9706 standards, in which the electrical continuity of each CTBGA84 component is monitored by using a high-speed event detector. The drop shock results are discussed in detail, and the cumulative failures are analyzed using Weibull plots.

The results confirm that, in general, the drop shock performance of heterogeneous solder joints depends on matching the melting behavior of the LTS alloy to an appropriate reflow profile. Additionally, further processing optimization during solder paste printing can be used for obtaining 100-200% higher drop shock performance using Alloy 3 and Alloy 4 solders. Such results are very encouraging for supporting the use of Alloy 3 and Alloy 4 solders in other applications requiring high drop shock resistance, such as mobile, handheld devices, and in-cabin automotive.

不断变化的封装和装配要求一直在推动着焊料合金朝着具有更高热循环和机械可靠性的方向发展。一直以来，人们对低温焊料(LTS)感兴趣，是因为它们可以降低材料和能耗成本，提高长期可靠性，并有助于降低劳动力和设备维护成本。最近，这种兴趣加速增长，其目标是为了减少超薄电子封装的动态翘曲，以满足移动通信，电脑、可穿戴设备和物联网设备等市场需求。

寻找一种合适的焊料合金，能够在较低的温度下进行加工，并形成具有高机械和热可靠性的焊点，并不是一件容易的事情。例如，某种合金可能具有较高的抗跌落冲击但较低的耐热循环性能，而另一种合金可能具有较高的耐热循环性能但较低的抗跌落冲击性能。然而，一个很少被讨论的事实是，非同质Sn-Bi-Cu/低温材料焊点需要比同质低温材料焊点更高的加工温度，才能获得相当的抗跌落冲击性能。本报告将展示第三代和第四代锡铋(SnBi)焊料的抗跌落冲击性能如何受到合金熔化行为、加工和装配条件的影响。

所评估的两种低温焊料（合金3和合金4）的铋含量在49-58%之间（重量百分比），添加剂导致了不同的合金微结构。 通过使用合金3和合金4的 4号粉锡膏在印刷电路板上封装有SAC305球的CTBGA84封装，得到混合合金焊点。在165 oC和175 oC的回流焊峰值温度下对这些焊点进行处理，这些温度大大低于SAC305的熔化范围，并对抗跌落冲击性能进行评估。跌落冲击测试程序采用电压法，基于JESD22-B111(2016年11月)和IPC/JEDEC 9706标准，通过使用高速事件检测器监测每个CTBGA84元件的电连续性。本文详细讨论了跌落冲击结果，并使用Weibull图对累计失效进行了分析。

结果证实，一般来说，混合合金焊点的抗跌落冲击性能取决于低温材料合金的熔化行为是否与回流曲线匹配。此外，在锡膏印刷过程中进一步的加工优化，可以利用合金3和合金4焊料获得100-200%以上的抗跌落冲击性能。这样的结果对于支持合金3和合金4焊料在其他需要高抗跌落冲击性能的应用是非常鼓舞人心的，如移动设备、手持设备和汽车内部设备等。

Speaker Biography 演讲者简介

Senior Technical Services Manager
Assembly Solutions MacDermid Alpha Electronics Solutions

William Yu is the Senior Technical Service Manager for MacDermid Alpha Electronics Solutions - Assembly Division. and his key responsibilities includes provision of technical and applications support, advice & recommendations to a vast array of customers in mainland China.

William has joined MacDermid Alpha Northern China from Jun 2004 as CTS engineer and became CTS manager in 2005. Before join MacDermid Alpha, he has previously worked in Lucent technology Shanghai and prior to joining MacDermid Alpha, was Senior Process Engineer in Flextronics and Tyco. He service for SMT Industry more than 20 years.

资深技术服务经理，组装部
麦德美爱法

余瑜是麦德美爱法组装部的资深技术服务经理。主要负责公司华北地区的产品应用和技

术支持工作。在2009年参与焊料国家标准的制定工作。在SMT行业有二十多年的实际工作经验，曾在朗讯科技、泰科、伟创力科技等多家电子企业任职。

An Alternative Lead-Free Low-Temperature Solder With Excellent Drop Shock Resistance
一种抗跌落性能优异的无铅低温焊料
(CE21-TC1.4)

Anson Yu 虞沈捷
Indium Corporation
铟泰公司

21 April 2021 (Wedesday)
2021年4月21日(星期三)
13:45-14:20
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Abstract 文章大纲

Low-temperature solders (LTS) with reflow peak temperatures of 200°C and below- have been studied intensively since 2017. The International Electronics Manufacturing Initiative's (iNEMI) Board and Assembly Roadmap forecasts up to a 20% adoption rate of LTS for board assembly by 2027. BiSn solders are the leading candidates in these studies because their low eutectic temperatures of 138°C allow the reflow peak temperature to be as low as 165°C–170°C. However, their low-melting temperatures may also limit their operation temperature, which restricts the product application with compromised reliability relative to SAC305. In addition, the intrinsic brittleness of Bi phases renders a poor drop shock performance. A Sn-rich In-containing solder paste—Durafuse ™ LT—reflowable at 200°C and above, was designed for excellent drop shock performance with acceptable thermal fatigue behavior. Durafuse™ LT is a mixed solder powder paste, in which In-containing powder will melt first around 118°C to spread and wet. Then, the Sn-rich powder (melting point >217°C) will keep dissolving into the molten solder during reflow. After reflow, the solder joint shows the remelting temperature around 189°C. The drop failure number of Durafuse™ LT (reflowed at 200°C peak temperature) is around two-orders-of-magnitude higher than that of BiSnAg eutectic solder and another ductile BiSnAg solder. By optimizing the reflow profile, the drop shock performance of Durafuse™ LT is superior to SAC305. Thermal cycling tests (-40 to 125°C, 10min dwelling) on BGA192 and a chip-resistor (1206, 0805, and 0603) demonstrated the dependence of the characteristic life on the reflow profiles. A plateau-type profile is preferred for excellent drop shock resistance and acceptable reliability performance.

自2017年以来，人们对回流峰值温度在200℃及以下的低温焊料(LTS)进行了深入研究。国际电子制造倡议组织(iNEMI)和电子制造发展路线图预测，到2027年低温焊接材料(LTS)在电子制造中的使用率将达到20%。铋锡焊料是这些低温焊接材料研究中的主要候选者：其低共晶温度为138℃，因此回流峰值温度可低至165℃- 170℃。然而，它们的低熔点也限制了BiSn焊点的工作温度，这就限制了产品的应用。相较于SAC305，它的可靠性也低一些。此外，Bi相的固有脆性使其抗跌落性能较差。一种可在200℃及以上温度下回流的富锡含铟锡膏durafuse™低温焊料，具有极佳的抗跌落性能和不错的热疲劳性能。Durafuse™LT是一种混合锡粉的锡膏，其中含铟的锡粉将在118℃左右首先熔化，以液态焊料形态进行扩散和润湿，然后，在回流焊接过程中，富锡锡粉(熔点>217℃)不断地溶解在液态焊料中。回流焊接后焊点重熔温度在189℃左右。Durafuse™LT (峰值温度为200℃时回流) 的抗跌落次数比BiSnAg共晶焊料和另一种具有延展性的BiSnAg焊料高出约2个数量级。通过优化回流焊接炉温曲线，Durafuse™LT的抗跌落性能优于SAC305。在BGA192和片式电阻(1206、0805和0603)上进行热循环测试(-40至125℃，停留10分钟)，证明了特性使用寿命对回流曲线具有依赖性。使用保温区间的炉温曲线能够提供更加良好的抗跌落冲击性能和不错的可靠性。

Speaker Biography 演讲者简介

Anson Yu is a Technical Manager for global accounts in Asia. Based in Suzhou, China, he is responsible for coordinating and managing technical service and resources to the global accounts-focused, multinational accounts in Asia.

Anson joined Indium Corporation in July 2018 and has more than 10 years of manufacturing and equipment engineering experience. Anson earned his bachelor's degree in electrical engineering from Nanjing Institute of Technology and a master's of business administration from Wuhan University.

虞沈捷是铟泰公司负责亚洲区域内全球性客户的技术经理，常驻中国苏州。主要负责整合和协调铟泰公司技术服务资源，帮助亚洲区域内跨国企业，全球性客户解决焊接问题及提供配套技术解决方案

虞沈捷于2018年四月加入铟泰公司，拥有10年以上的电子制造相关的工艺及设备经验。于南京工程学院取得电气工程及其自动化的学士学位，及武汉大学工商管理硕士学位。

Investigation On the Failure Mechanism of Electrochemical Migration of Printed Circuit Board Under The Soluble Salts In Dust
尘土中可溶性盐作用下的电路板电化学迁移失效机理研究
(CE21-TC1.5)

Dr. Yilin Zhou 周怡琳博士
School of Artificial Intelligence
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北京邮电大学人工智能学院

21 April 2021 (Wednesday)
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Abstract 文章大纲

With the development of electronic equipment towards miniaturization and high-density, the electrochemical migration (ECM) between adjacent electrodes on the high-density printed circuit board (PCB) under the effect of temperature, humidity and bias voltage is becoming more and more severe. In addition, the dust in the air pollution environment enters into the electronic products with the air flow and adheres to the surface of PCB, which has a complex impact on the ECM process. In this paper, two kinds of ECM test methods, water drop test (WD) and temperature humidity bias test (THB), were used to study the mechanism and characteristics of the effect of soluble salt in dust on the ECM failure of PCB. NaCl was selected as a representative substance of soluble salts to conduct WD test and THB test with different concentrations respectively. The time to failure of ECM under different conditions was obtained by online detection of the surface insulation resistance of PCB, so that the relationship between insulation failure of the circuit board and the salt concentration was analyzed. Based on the electrochemical theory, the action mechanism of soluble salt on the ECM of PCB was discussed by combining with the growth morphology of dendrites and the detection of the element compositions. The similarities and differences of ECM under two different experimental methods under soluble salt pollution were compared so as to analyze the influence of dust pollution on the reliability of high density circuit.

随着电子设备向小型化和高密度化趋势发展，在温度、湿度、电压作用下高密度电路板相邻电极之间电化学迁移失效问题日益严重。

此外，大气污染环境下的尘土随空气进入电子产品内部并附着在电路板的表面，对电化学迁移过程产生复杂影响。本文主要通过水滴实验和温湿偏置实验两种加速模拟测试方法，研究尘土中可溶性盐对浸银电路板电极间电化学迁移失效的作用机理及特性。选取可溶性盐代表物质NaCl，分别进行不同浓度的NaCl覆盖电路板的水滴实验和温湿偏置实验。通过在线检测电路板表面绝缘电阻变化，获取不同环境条件下的电路板电化学迁移失效寿命，分析电路板绝缘失效与盐浓度的关系。结合电化学迁移中晶枝生长的形貌观察和成分检测，基于电化学理论讨论尘土可溶性盐对电路板电化学迁移的作用机理。对比两种不同加速实验方法下的电路板电化学迁移特性的异同，分析尘土污染对高密度电路可靠性的影响。

Speaker Biography 演讲者简介

Yilin Zhou received the B.S. degree in mechanical and electrical engineering and Ph. D. degree in circuit and system from Beijing University of Posts & Telecommunications (BUPT), Beijing, China, in 1994 and 1999 respectively.

Since 1999, she has worked in Automation School, BUPT. She is now a professor of School of Artificial Intelligence, person in charge of measurement and control technology and instrument. She ever worked in the Center for Advanced Life Cycle Engineering (CALCE), University of Maryland, College Park, as a visiting scholar from Aug., 2007 to Aug., 2008. She is also the vice chairman of Connector and Switch Technical Committee of China Electronic Society.

She is interested in the study of reliability of electric connection and electric packaging, failure analysis of electrical components, prognostics and health management. She has published more than 50 papers about the reliability of electric connection, authorized 5 national invention patents. She undertaken and participated in 4 projects of National Natural Science Foundation of China, 4 projects of provincial and ministerial level, more than 20 projects of international and domestic enterprises, served as communication evaluation expert of National Natural Science Foundation of China and paper reviewer of many famous international journals.

周怡琳，博士，教授，博士生导师

于1994年获北京邮电大学电子精密机械专业工学学士学位，1999年获北京邮电大学电路与系统工学博士学位。2007-2008年于美国马里兰大学先进寿命循环工程中心做访问学者。现为北京邮电大学人工智能学院教授，测控技术与仪器专业负责人。兼任中国电子学会连接器与开关技术委员会副主任委员。研究兴趣主要涉及电连接和电封装可靠性、电子元件故障分析、故障诊断与系统健康管理等。已发表相关科研论文50余篇，授权国家发明专利5项。承担和参与国家自然科学基金4项，省部级项目4项，国际企业合作和国内企业合作20余项。担任国家自然科学基金通信评议专家，国际多个著名刊物的论文审稿人。

Accelerating Continuous Improvement With Next Generation pH Neutral Cleaning Products
新一代pH中性清洗剂推动清洗工艺持续改进
(CE21-TC1.6)

Jerry Ji 纪建光
ZESTRON North Asia
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Abstract 文章大纲

Electronic assembly defluxing is a critical process step particularly for those manufacturing IPC Class III electronics. A key component of the cleaning process is the use of aqueous-based engineered cleaning solutions. Today, most commercially available cleaning agents are inhibited to protect sensitive components and formulated using either pH alkaline or pH Neutral basis on which the remainder of the formulation is designed. Once optimized, these cleaning agents effectively remove post solder residues from around and underneath all of the components thereby ensuring the manufacturer that their assemblies can meet the desired reliability requirements.

Electronic assemblies continue to grow more complex in terms of component design, board density, reduced standoff heights, and increased use of specialized but more sensitive material sets. Different market sectors may have unique materials that need to be considered when developing and/or selecting a chemistry for the cleaning process. Moreover, with the advancements in component technology and increased demand for smaller, denser connections and as those connections migrate inside the package, the conventional line between packaging and assembly has blurred. These advances continually challenge the cleaning process.

An effective cleaning process involves a combination of mechanical, thermal and chemical energies. Often times, cleaning process improvements can be realized by improving the mechanical energy in terms of spray bar configuration, spray nozzle specifications, and spray pressure, thermal energy by adjusting the cleaning agent wash temperature, and chemical energy by adjusting the cleaning agent concentration. However, chemical energy can be improved by increasing the solvency of the cleaning agent itself as it relates to specific residues.

In this study, several companies explored alternate cleaning agent options in pursuit of continuous process improvement as well as meeting new product cleaning challenges. Each company was using an inline cleaner with an aqueous based cleaning agent and each had an optimized process that met their cleaning process requirements. However, they elected to explore the benefit of a cleaning agent with greater solvency in an effort to improve overall process efficiency and to expand the process window.

This paper documents their current cleaning process as well as presents field data detailing the cleaning process performance improvements and resulting cleanliness levels achieved on complex assemblies through the use of a cleaning agent with greater solvency.

在电子组装中，特别是对于那些制造IPC III类电子产品的企业来说，去除助焊剂是一个重要的工艺步骤。清洗工艺的一个关键组成部分是水基清洗溶液的应用。目前，市场在售的大多数清洗剂因需要保护敏感器件受到抑制，且配方上只能采用其它合适的pH碱性或pH中性成分。如果清洗剂配方可以优化，这些清洗剂将能有效地清除组件四周及底部的焊后残留物，使制造商确保他们的组件可以满足所期望的可靠性要求。

电子组装在元件设计、电路板密度、低间隙高度以及更多专用且更敏感材料组的使用方面继续变得更加复杂。当开发和/或选择用于清洁工艺的清洗介质时，针对不同应用市场，需要专门研究不同的材料。此外，随着组件技术的进步和市场对更小外观、更密排列的需求增加，以及随着这些连接在封装内部的迁移，封装和组装之间的传统界限已经模糊，使得清洗工艺不断面临更大的挑战。

有效的清洁工艺涉及机械能、热能和化学能的三者结合。通常情况下，改善清洗工艺可以通过调整喷管配置、喷嘴规格和喷射压力等提升机械能，可以通过调整清洗剂的清洗温度增加热能，以及通过调整清洗剂浓度提高化学能。然而，由于清洗剂与特定残留物有关，提高清洗剂本身溶解能力也可以增大化学能。

在这项研究中，为了追求工艺的持续改进同时应对清洗新产品面临的挑战，几家公司对清洗剂替代品的选择进行了探究。每家公司都使用在线清洗设备和水基清洗剂。而且每家公司都有一个符合其清洁工艺要求的优化工艺。最后，他们选择继续了解具有更大溶解能力的清洁剂的益处，以努力提高整体工艺效率并扩大工艺窗口。

本文记录了他们目前的清洗工艺，并提供了现场数据，详细说明了清洗工艺性能的改进，以及通过使用更具溶解能力的清洗剂在复杂组件上实现的清洁度水平。

Speaker Biography 演讲者简介

Jerry Ji is the experienced proces engineer of ZESTRON North Asia. He has more than 10 years working experiences in Semiconductor and electronic manufacturing industry. Before joining ZESTRON, he worked for several world leading companies.

纪建光先生是ZESTRON北亚地区上海分公司经验丰富的应用技术工程师。他拥有超过10年的半导体制造业、电子制造业工作经验，在加入ZESTRON之前，曾经在多家世界著名公司就职。

Technology Conference
高科技技术研讨会

(CE21-TC2)

Can Low Cost Silver Free Alloy Be Used In Type II & III Assemblies
低成本无银合金可用于II型和III型组装吗?
(CE21-TC2.1)

William Yu 余瑜
MacDermid Alpha Electronics Solutions
麦德美爱法

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Abstract 文章大纲

Hole fill requirements in Types II and III assemblies had traditionally required the use of Ag bearing Pb-free alloys during wave soldering. As a result of continuous alloy developments, an opportunity now exists to employ Ag-free Pb-free alloy that can meet such hole fill requirements.

The significant improvement in wetting performance, of this new Ag-free alloy, has led to successful wave soldering assembly of complex boards. SAC305 hole fill performance has been achieved using an Ag-free, low cost alloy in a wave soldering process.

Potentially more than 40% cheaper than SAC305 within a typical wave soldering setup with no additional modifications or upgrades needed, there is strong impetus to explore suitable assembly opportunities with this Ag-free alloy.

Reduced Cu dissolution is an important process control parameter that is used to characterize the performance of different materials. The Cu dissolution becomes ever more important considering the present trend in the electronic assembly industry to move to non-metallic pad finishes. The reduced Cu dissolution speed preserves the integrity of the Cu traces and extends the life of the wave solder alloy.

Underside QFP saw great reduction of bridging when compared with other alloy candidates. This is due to proprietary additives in this Ag-free alloy, that enhances wetting force and shortens wetting time. Overall reduction in solder bridging can be expected with all other components.

The natural reduction in thermal cycling performance of Ag-free alloy remains, as seen in comparisons with SAC305. However, many Types II and III assemblies are Class 2 compliant, opening many attractive opportunities with this exciting alloy development.

This paper lays out the key elements working together to deliver optimal performance at the lowest cost currently available in a very matured process.

Key words: Ag-free, hole fill, wave soldering, Cu dissolution, Type III assembly

对于第II及III型组装的填孔，传统上需要在波峰焊工艺中使用含银无铅合金。但随着合金的不断发展，现在有机会使用无银无铅合金以满足此类填孔要求。

这种新型无银合金显著提高了润湿性能，并且已经成功完成了复杂板片的波峰焊接组装。在常规波峰焊中使用无银低成本合金能实现SAC305类似的填孔性能。

在典型的波峰焊接装置中，无需额外调整或升级，其价格可能比使用SAC305便宜40%以上，这为探索使用这种无银合金所适用的组装机会提供了强大的动力。

减少铜腐蚀是这种无银合金的另一个强大优势。考虑到电子组装行业当前向非金属焊盘表面处理的过渡趋势，这一点变得越来越重要。降低铜溶解速度可保留铜线的完整性，并延长波峰焊合金的寿命。

归因于这种无银合金中的专有添加剂，可提高润湿力并缩短润湿时间。与其它合金相比，底面方型扁平封装（QFP）的桥接不良减少了很多。预计所有其他组件的焊接桥接将减少。

但是，与SAC305相比，无银合金的热循环性能仍然略有差距。不过，许多II型和III型组件均能达到2级标准，这为合金开发带来了许多极具吸引力的机会。

本文列出了在非常成熟的工艺中以最低的成本来实现空前优异性能的关键要素。

关键词：无银，填孔，波峰焊，铜溶解，第III类组件

Speaker Biography 演讲者简介

Senior Technical Services Manager Assembly Solutions MacDermid Alpha Electronics Solutions

William Yu is the Senior Technical Service Manager for MacDermid Alpha Electronics Solutions - Assembly Division. and his key responsibilities includes provision of technical and applications support, advice & recommendations to a vast array of customers in mainland China.

William has joined MacDermid Alpha Northern China from Jun 2004 as CTS engineer and became CTS manager in 2005. Before join MacDermid Alpha, he has previously worked in Lucent technology Shanghai and prior to joining MacDermid Alpha, was Senior Process Engineer in Flextronics and Tyco. He service for SMT Industry more than 20 years.

资深技术服务经理，组装部
麦德美爱法

余瑜是麦德美爱法组装部的资深技术服务经理。主要负责公司华北地区的产品应用和技术支持工作。在2009年参与焊料国家标准的制定工作。在SMT行业有二十多年的实际工作经验，曾在朗讯科技、泰科、伟创力科技等多家电子企业任职。

The Relationship Between Cleanliness and Reliability/Durability
清洁度与可靠性/耐用性的关系
(CE21-TC2.2)

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Abstract 文章大纲

Cleaning or lack thereof can have a serious impact on the long-term durability and reliability of some finished products. Using a single number conductive measurement limit as a control basis for key precision or critical cleaning processes can be tremendously risky and expensive. IPC removed from the J-STD-001 Rev. H, the ROSE limit of 1.56ug/cm² as a statement of “Clean” due to modern flux, component, and board designs. One size no longer fits all with today’s technology. This is the reason the IPC J-STD-001 no longer sets a limit for the ROSE, and in fact WP-019B states “passing the ROSE test using the 1.56 value, does not guarantee that an assembly is clean, good or acceptable.” Likewise , the PM-019B also states there are no pass-fail levels for Cation or Anion levels in Ion Chromatography. The

question, answer, and responsibility fall on the manufacturer and/or OEM to determine the acceptable ROSE limit will meet their cleanliness needs for reliability, based on objective evidence.

In this paper we will explore how a PCB can achieve a ROSE value under the previous 1.56 ug/cm recommended limit, as well as industry acceptable limits of ion chromatography, yet still not meet the reliability and durability requirements of field operation. Dendrites formed causing field failures even after cleaning to the previously stated acceptable limits. By modifying the process parameters of the cleaning process, conducting chemical and electrical testing to validate it meets acceptable performance under harsh conditions, one can use objective evidence to re-establish the correct ROSE value. This exercise re-confirms the relationship between cleanliness and a product's reliability and durability in the field. This paper will walk through the necessary steps needed to determine what the acceptable number is required to meet each product reliability demands and why. We will further explore why some products can pass with a higher number and/or a different cleanliness measurement, how you can avoid mistakes in a very competitive market, and reduce your cost while improving brand reputation. Daniel Gao will present:

• Process Qualification/Monitoring test results vs. SIR/HTHE results on live product.
• Examples of these qualification parameters follow, but ended in field failures due to dendrites
• What environments pose the greatest risk.
• What areas of the assembly tend to be most problematic
• Steps necessary to monitor and maintain consistent cleanliness.

An open Question and Answer session will enable attendees to discuss their specific process needs and changes to successfully maintain a robust cleaning process.

对某些成品而言，是否清洁对其长期耐用性和可靠性将产生显著影响。如果采用单一导电测量限值作为关键精度或关键清洁流程的控制依据，不仅风险较大，而且成本昂贵。
考虑到现代焊剂、元件和板设计等因素，在J-STD-001（修订版H）中，IPC删除了将1.56ug/cm² ROSE（萃取溶液电阻率）测试限值作为判定"清洁"的陈述。单凭单一方式判定已不再适合当前技术。正因为此，IPC J-STD-001不再设立ROSE限值。根据WP-019B规定，"即使通过1.56ug/cm²限值的ROSE测试，并不能保障组件是清洁、良好或可接受的"。类似的，PM-019B还规定，在离子色谱法中，并未设定阳离子或阴离子水平的通过-不通过标准。至于相关问题、解答和职责，由制造商和/或原始设备制造商根据客观证据自行决定可接受的ROSE限值是否满足达到其可靠性需求的清洁度。

在本文中，我们将探讨在先前1.56ug/cm²建议限值的条件下，印刷电路板（PCB）如何达到ROSE限值要求以及离子色谱的行业可接受限值，但依旧无法满足现场操作的可靠性和耐用性要求。即使经过清洁，可达到先前所述的可接受限值，也可能发生导致现场失效的枝晶现象。通过更改清洁流程参数，开展化学和电子测试，验证在严苛条件下是否满足可接受的性能要求。这样一来，人们可采用客观证据，重新确定正确的ROSE数值。这一方式再次确定了清洁度和现场产品可靠性和耐久性的关系。本文将通过必要步骤，确定满足各产品可靠性要求的可接受数值及其原因。我们将进一步探讨为何某些产品能够以较高数值和/或不同的清洁度测量方式通过测试，您在及其复杂的市场中该如何避免错误，以及如何在提升品牌度的同时降低成本。高伟将展示以下内容：

•在实时产品上，工艺鉴定/检测测试结果与表面绝缘电阻（SIR）/高温高湿（HTHE）结果 。
•上述鉴定参数示例如下所示，但最终由于枝晶而导致现场失效。
• 哪些环境将构成最大风险。
• 哪些组装区域最易产生问题。
• 监控和保持一致清洁度的必要步骤。

在开放问答环节，与会者可讨论各自的特定流程需求和变更，以确保维护良好的清洁流程。

Speaker Biography 演讲者简介

Daniel Gao is Northern/Western China Sales Manager of KYZEN Corporation based in BeiJing. He has more than 17 years of experience in semiconductor applications and electronic assemblies including Wafer Bumping process, Flip Chip packaging, LED packaging, PCB assembly applications. Daniel worked in KYZEN more than 10 years, he is responsible for North/Western China sales and customer technical support, cooperating with solder paste and cleaning machine suppliers.

高伟是KYZEN公司在中国北部/西部的销售经理，工作地点在北京。高伟拥有十七年在半导体应用和电子装配方面（具体包含晶圆凸块工艺、倒装芯片封装、LED 封装、PCB装配工艺）的工作经验。高伟在KYZEN 任职超过十年，主要负责中国北部/西部市场的销售、技术支持，多与焊膏及清洗设备厂商有合作。

Minimizing Voiding In QFN Packages Using Solder Preforms
通过预成型焊片降低QFN空洞
(CE21-TC2.3)

Leon Rao 饶乐
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Abstract 文章大纲

According to Prismark Partners, the use of quad-flat no-leads (QFNs) is growing faster than any package type except for flip-chip CSPs. Prismark projects that by 2013, 32.6 billion QFNs will be assembled worldwide, which represents 15% of all IC packages.

However, QFNs can be a challenge to assemble, especially when it comes to voiding. In most QFN assembly processes, solder paste is used as a means of attachment. This approach can be problematic, as excessive voiding often occurs due to the lack of standoff on the component and the high flux content of the paste. The addition of a solder preform can reduce such voiding by increasing the solder volume of the joint without adding flux volume.

Adding preforms to an assembly process is very easy. Preforms are packaged in tape & reel for easy placement by standard pick and place machines, right next to your components. The focus of this paper will quantify the preform requirements and process adjustments needed to use preforms in a standard SMT process. In addition, experimental data showing void reduction using preforms will also be presented.

Keywords: QFN, solder preforms, QFN packages, flux

根据Prismark Partners公司的分析，除了倒装芯片CSPs外，方形扁平无引脚封装(QFNs)的使用比其它类型的封装都增长得更快。Prismark公司预测2013年世界各地将会有326亿的QFNs被装配，占据所有IC封装的15%。

然而，QFNs的装配将会是个挑战，特别是当其涉及到空洞的时候。在很多QFN装配工艺中，锡膏是一种较为常见的装配材料。这种装配方式可能会产生些问题，这是因为元器件与焊盘间的细间隙以及锡膏中较高的助焊剂含量会导致过多的空洞形成。而预成型焊片则可以减少这类空洞的产生，因为预成型焊片可以在不增加助焊剂用量的情况下增加焊料量。

添加预成型焊片是一个非常简单的装配工艺。预成型焊片采用的是卷带式包装，贴片设备可以轻松地拾取放置。本文将重点介绍在标准的表面贴装工艺中如何进行预成型焊片的选择和工艺调整。另外，也将分享使用预成型焊片减少空洞的数据。

关键词：QFN，预成型焊片，方形扁平无引脚封装. (QFN封装)，助焊剂

Speaker Biography 演讲者简介

Leon Rao is a Senior Technical Support Engineer for Indium Corporation's customers in Eastern China. He is based in Suzhou, China.

Leon is responsible for providing comprehensive technical advice in the selection, use, and application of Indium Corporation's entire range of products to customers in the Shanghai and Hangzhou area.

Leon joined Indium Corporation in 2013 as a Technical Support Engineer. He has extensive experience providing on-site support for new product evaluations, product selection, and troubleshooting.

饶乐，铟泰公司苏州公司的高级技术支持工程师，主要负责为上海和杭州地区客户提供技术支持服务。拥有大量的在线支持、新产品评估、产品选择和故障排查的经验。

Weak Organic Acids-Detection and Reliability Assesment
弱有机酸-检测和可靠性评估
(CE21-TC2.4)

Dillon Zhu 朱军桦
AIM Solder

22 April 2021 (Thursday)
2021年4月22日(星期四)
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Abstract 文章大纲

Weak Organic Acids (WOA) are a common component of no clean liquid flux. These acids provide the cleaning and etching capabilities required to prepare surfaces to accept solder. They are also a source of chemical contamination that can cause electrical and corrosive failures on circuit assemblies. The ability to assess the risk of flux residue after soldering in the production environment is a challenge for assemblers and flux manufacturers alike. In this study the accuracy of common residue extraction methods and a comparison of electrical and soldering performance of common WOA is performed to illustrate the challenges associated with flux residue assessment as it relates to reliability.

弱有机酸（WOA）是免洗液体助焊剂的常见成分。这类酸在表面提供清洁和蚀刻能力使其准备好接受焊料。它们也是化学污染的来源，可导致电路组件的电气和腐蚀性故障。在生产中评估助焊剂残留风险的能力对组装商和助焊剂制造商来说都是一个挑战。在这项研究中，对常见残留物提取方法的准确性以及普通WOA的电气和焊接性能进行了比较，以说明助焊剂残留物评估的挑战，因为它涉及可靠性。

Speaker Biography 演讲者简介

Dillon Zhu is Regional Technology Support Manager of China at AIM, the expert in SMT manufacturing field. He has 20 years of SMT equipment and process experience, with position as process for 8 years at Inventec. As server mother board PCA process development engineer in Inventec server business group. Dillon is experienced with PCBA manufacturing process, including SMT process and DIP process。 Since 2008 Join AIM solder Team. He has been at the scene of the customers solve the SMT and Wave solder troubleshooting. (Paste, flux, bar, wire etc.) Provide timely support to solve customer escalated soldering issues.

朱军桦，AIM区域技术支持经理，SMT制造领域专家，拥有二十年的SMT设备及工艺的从业经验，曾在英业达集团工艺部门工作了八年。朱军桦对PCBA生产工艺有丰富的经验。自2008年加入 AIM工作以来，一直在不同领域的客户现场解决SMT和Wave的工艺问题，并对客户反映的各种技术工艺难疑点进行技术分析。

Can All Liquid Fluxes Work Well On OSP Pad Finish?
所有液态助焊剂都能良好地应用于回流后的OSP焊盘表面吗?
(CE21-TC2.5)

William Yu 余瑜
MacDermid Alpha Electronics Solutions
麦德美爱法

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Abstract 文章大纲

Printed circuit board (PCB) assemblers are increasingly using Organic Solderability Preservative (OSP) as their preferred surface finish due to several advantages of this coating over metallic surface finishes. However, OSP coatings after exposure to one or more thermal excursions can become more challenging to solder especially during wave solder applications. For example, a thick multi-layered double-sided PCB coated with OSP that has been exposed to one or more SMT solder paste reflow cycles may experience reduced solder wetting or hole fill by the assembler when wave soldered.

PCB manufacturers and assemblers believe this reduction in solder wetting on pre-reflowed OSP is due to thermal degradation of OSP coating. Different mechanisms for this thermal degradation of OSP coating have been proposed by researchers. But until now no complete study has been reported detailing the chemical nature of the degradation and how to address the poor wetting issue on such degraded OSP coating.

In the current study, we have investigated the chemical changes OSP coating undergoes in thermal excursions. Elements of soldering flux that may neutralize the effect of such degradation were short-listed. Wetting property of Pb-free solder on thermally exposed OSP was studied in presence of these elements and fluxes containing them.

由于有机可焊性防腐剂(OSP)比金属表面处理有着不少优势，越来越多印刷电路板(PCB)装配商選擇使这种涂层作为他们的首选表面处理方式。然而，OSP涂层在接触一次或多次热波动后可能会变得更加难以焊接，特别是在波峰焊应用中。例如，如果OSP涂层的厚多层双面PCB经历一次或多次表面贴装焊膏回流焊后，装配件在波峰焊时可能会出现焊接润湿或孔填充性能的降低。

PCB制造商和装配商认为，预回流焊OSP上焊料润湿性的降低是OSP涂层的热降解所造成的。对于这种OSP涂层的热降解，研究人员已经提出了不同的机制。但到目前为止，还没有完整的研究报告详细说明这种降解的化学性质，以及如何解决OSP涂层这种降解所造成的润湿性变差的问题。

我们研究了OSP涂层在热游离时发生的化学

变化，并列出了可能中和这种退化影响的焊剂元素。进而，本文研究了在有这些元素及含有这些元素的助焊剂情况下，无铅焊料接触后OSP时的润湿性能。

Speaker Biography 演讲者简介

Senior Technical Services Manager
Assembly Solutions MacDermid Alpha Electronics Solutions

William Yu is the Senior Technical Service Manager for MacDermid Alpha Electronics Solutions - Assembly Division. and his key responsibilities includes provision of technical and applications support, advice & recommendations to a vast array of customers in mainland China.

William has joined MacDermid Alpha Northern China from Jun 2004 as CTS engineer and became CTS manager in 2005. Before join MacDermid Alpha, he has previously worked in Lucent technology Shanghai and prior to joining MacDermid Alpha, was Senior Process Engineer in Flextronics and Tyco. He service for SMT Industry more than 20 years.

资深技术服务经理，组装部
麦德美爱法

余瑜是麦德美爱法组装部的资深技术服务经理。主要负责公司华北地区的产品应用和技术支持工作。在2009年参与焊料国家标准的制定工作。在SMT行业有二十多年的实际工作经验，曾在朗讯科技、泰科、伟创力科技等多家电子企业任职。

Selective Solder Fine Pitch Components On High Thermal Mass Assembly
选择性焊接高热质量组装的细间距引脚零件
(CE21-TC2.6)

Binhua Yu 於斌华
ITW Electronics (Suzhou) Co., Ltd.
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Abstract 文章大纲

The number of through-hole components on printed circuit boards (PCB) has declined significantly over the last decade. Miniaturization in electronics has resulted in less THT (through-hole technology) and leads with a finer pitch. For this reason, the soldering of these components has also changed from wave soldering to Point-to-point selective soldering. Soldering these small, fine-pitch components is a challenge when surface mount components (SMD) are positioned very close to THT components on the PCB layout. This study, done in cooperation with a large automotive EMS customer, defines the process windows for through-hole technology for fine-pitch components. It determines what is feasible to solder and defines layout design parameter that make soldering possible with SMD areas and other components on the assembly.

Key words: fine pitch, point-to-point, selective soldering, THT.

在过去十年中，印刷电路板（PCB）上的通孔元件数量显著减少。电子产品的小型化减少了THT(通孔技术)，并且具有更精细的间距。 因此，这些组件的焊接也从波峰焊改为点对点选择性焊接。当表面安装组件(SMD)的位置非常接近PCB布局上的THT组件时，焊接这些小型细间距元件是一项挑战。 这项研究与大型汽车 EMS 客户合作完成，定义了精细间距组件通孔技术的工艺窗口。 它确定焊接的可行性，并定义布局设计参数， 使焊接在SMD 区域和装配上的其他组件成为可能。

关键词：精细间距、点对点、选择性焊接、THT。

Speaker Biography 演讲者简介

Binhua Yu, Application Manager of ITWEAE

Binhua Yu has 25 years' experience on SMT industry, more than 15 years working on soldering process and soldering machine design.

Binhua Yu worked for Nokia (Suzhou) Telecommunication as process specialist and quality specialist, and worked for Apple Computer as supplier quality manager.

Since 2004 Binhua joined Virtronics Soltec as application manager for soldering equipment – reflow oven, wave soldering machine and selective soldering machine. From 2009 to 2014, he worked as engineering manager of Virtronics Soltec (Suzhou) plant. His responsibilities cover soldering process study, customer support and soldering machine development.

於斌华，依工电子设备(苏州)有限公司应用经理

於斌华 在SMT相关行业工作了25年，当中的15年专注在焊接工艺的研究和焊接设备的设计。

曾经就职于诺基亚通讯（苏州）公司，任职工艺专员和质量专员。也曾就职苹果电脑公司任职供应商管理。

2004年加入Vitronics Soltec公司，任职焊接设备应用经理，涉及回流焊，波峰焊和选择性焊接。期间从2009到2014年就职Vitronics Soltec苏州工厂的工程经理，职责涵盖焊接工艺研究，客户技术支持以及焊接设备的研发。
