

# MicroLED 在各方面取得发展: 它们达到脱离速度了吗? <sup>1</sup>

*虽然成本是最大的挑战, 但苹果和三星正在为消费者开辟道路。*

## 概要:

- 冠状病毒暴发:  
因冠状病毒的暴发导致复杂的跨境合作和工具安装,减慢了 2020 年和 2021 年的发展速度。  
尽管如此, 势头比以往任何时候都强, 我们也看到了许多有利因素。
- 成本问题:  
众所周知的科学: microLED 是一种巨大的工程和制造项目。  
成本是最大的挑战。  
除了 AR<sup>2</sup> 和 可穿戴, 要解决消费者应用就需要降低到 20 倍至 50 倍。
- 生态系统:  
经过多年的有限努力, 缓慢进展, 不确定的前景, MicroLED 多亏资金, 资源, 前景以及提升开发速度的常用道具的可用性, 现已达到了脱离的速度。  
2021 年三星和 Vuzix (和 JB Display 一起) 介绍了第一个商用 microLED 产品。

“显示器产业现在有利于 microLED: 中国赢得了 LCD<sup>3</sup> 战争, 且该行业正在专注于差别化和可提供高利润的技术上。”据 **Yole Développement (Yole)** 的显示器技术及市场首席分析师 **Eric Virey** 所说. 他还补充道: “因 COVID 带来的需求增加, 它已转为盈余, 并正在创造出资助新技术的现金. 虽然 LCD 商业模式需要吸收巨大的 fab 费用并为了在高端产品上赚钱需要大量的商品, 我们可以看的出 microLED 的 CapEx-light 操作的焦点集中在了高端市场上”。

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<sup>1</sup> 摘取

MicroLED Displays 2021 市场, 工业和技术趋势报告, Yole Développement  
MicroLED Displays – 2021 知识产权现状和分析报告, Yole Développement

<sup>2</sup> AR: Augmented Reality 增强现实

<sup>3</sup> LCD: Liquid Crystal Display 液晶显示器

在这种背景下, Yole 为了最新创新和商机提供了颠覆性显示器技术和相关市场的深度调查。

所以, Yole 发布了 [MicroLED Displays–2021 知识产权现状和分析报告](#). 这个报告详细介绍了 microLED display 的技术状态, 并了解每个节点的最新技术和趋势。

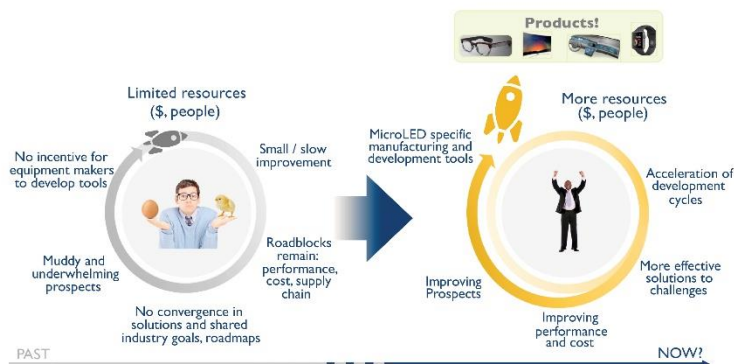
另外, 今日发布的 [MicroLED Displays 2021 市场, 工业和技术趋势报告](#) 中展现了市场趋势和展望, 供应链发展, 技术趋势, 技术见解和分析, 建议和展望以及主要领先企业的生态系和战略的深度理解。

**MicroLED 技术的现状如何? 最新发展是什么? 还需处理的夹点是什么? 哪些应用会适用 microLED 以及何时? 谁是需要关注的供应商以及开发何种创新技术?**

Yole 今天提出了对 microLED 显示器行业的远景。

### Has microLED display industry reached escape velocity?

(Source: Microled Displays - Market, Industry and Technology Trends 2021 report, Yole Développement, 2021)



正如 Yole’s 团队分析的 [MicroLED Displays 2021 市场, 工业和技术趋势报告](#), 苹果在收购 LuxVue 时将 microLED 标示在了地图上. 显示器制造商最初是持怀疑的态度的, 但现在确信 microLED 显示器在某些应用中将会是可信的竞争者. 因此, 资金和资源将流入到 microLED, 促进更快的发展循环, 改善前景已吸引更多的投资。

据 Yole 的 **Imaging & Display** 活动部的首席分析家 **Zine Bouhamri** 所说: “LCD 或 OLED<sup>4</sup> 将不会起飞, 直到 HVM<sup>5</sup>. . .设备制造商们目前有在提供 microLED 专用工具, 虽然有些因标准流程的不足受到阻碍, 但是有在开发包括转让, 检查和修复的一站式解决方案”。

<sup>4</sup> OLED: Organic Light Emitting Diode 有机发光二极管

<sup>5</sup> HVM: High Volume Manufacturing 大批量制造

大量传送不再被大多数参与者视为根本障碍. 许多问题仍旧存在, 但业界看到了更清洗的跑道. 使用 ASMPT, Toray, Coherent/3D Micromac 和其他不同流程的商业工具正在加快发展. 更多的产品来自 TDK, V-Technology, Besi, Bolite/Contrel 等.

三星和 Vuzix (和 JB Display) 在 2021 年介绍第一个商业用 microLED 产品. 虽然显示器行业的指针未能移动, 但却是一个积极乐观的发展.

### LCD vs. microLED cost reduction paths

(Source: Microled Displays - Market, Industry and Technology Trends 2021 report, Yole Développement, 2021)



强势的势头并不保障成功: 许多技术和供应链问题仍然威胁 microLED 脱轨. 许多解决方案在纸上看起来很优秀, 但在大批量生产环境中实现一体化更具有挑战性. 成本是 #1 障碍, 对于消费者产品来说仍然高于 20 倍至 50 倍.

25 年来, LCD 成本从 US\$30k/m<sup>2</sup> 至 US\$100/m<sup>2</sup> 下降了 300 倍. 不管怎样, LCD 始于空白画布. 降低成本的机会无处不在: 材料, 设备, 工艺等. 减少的大部分是通过扩充实现. 另一方面 MicroLED 存在于成熟的半导体, LED 和平板显示器产业的交叉点. 提供降低 300 倍成本的贡献者较少, 但 microLED 还有尚未利用的技术以及尚未活用 wafer 处理设备的情况较多, 这些可以帮助提供重大的改进.

对于 Eric Virey: “苹果清楚地看到: 为了实现 LED 产业尚未开发的已成熟的 SEMI 制造理念的惊人效率, 他们正在以 200mm wafer 推动供应链”.

这种风险和初期需要昂贵费用的赌注可以在需要很小, 低成本且高性能的芯片的智能手机市场中给公司带来独特的优势, 以便得到回报.

目前, 大部分的参与者在等待 microLED 的展望能够更明确的同时在建立原先 4” LED fabs 的知识 以及考虑降低成本. 这种方法可以用在 1st 产品 (B2B TV 等) 或小型显示器上, 但可能不会提供消费者 TV 或智能手机 HVM 所需的小尺寸模具和性能.

Yole Développement 全年发布众多的关于显示器的专用报告以及分析师们将参与主要会议和活动。

**OLEDs**  
WORLD SUMMIT

在这方面, 请不要错过 9 月 14 日的 OLEDs World Summit 2021 和 Eric Virey 的发布会: “下一代显示器跟 MicroLED 竞争?”, [在这里注册](#)!

此外, Zine Bouhamri 参加了第 28 届 主动矩阵平板显示器和设备的国际研讨会: [在这里](#) 确认。

专家们还提供各种关键文稿: 在 [i-Micronews 展示区](#) 确认 Eric Virey 的最新文稿

- “从 Lab 到 Fab: 大容量 MicroLED 制造设备的挑战和要求事项” - Display Week 2021
- “Quantum Dots, OLED, MiniLED, MicroLED, NanoLED: 为下一代 TV 的技术环境” – Techblick 显示器 和 照明: 创新与市场趋势 2021.

请确认该行业的最新消息以及在 [i-Micronews](#) 上确认与相关领先企业的访谈和包含其他情报的我司活动. 敬请关注!

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### About our analysts

**Eric Virey, PhD.** serves as a Principal Display Market and Technologies Analyst within the Photonics, Sensing & Display division at Yole Développement (Yole). Eric is a daily contributor to the development of the Display activity at Yole, with a large collection of market and technology reports on display technologies, Quantum Dots, MicroLEDs, TFT backplanes as well as multiple custom consulting projects: business strategy, identification of investments or acquisition targets, due diligences (buy/sell side), market and technology analysis, cost modelling, technology scouting, etc. Eric has spoken in more than 50 industry conferences worldwide over the last 10 years. He has been interviewed and quoted by leading media over the world including: The Wall Street Journal, CNN, Fox News, CNBC, Bloomberg, Financial Review, Forbes, Technology Review, etc. He is also a regular contributor to various display industry media and organizations. Previously Eric has held various R&D, engineering, manufacturing and business development positions with Fortune 500 Company Saint-Gobain in France and the United States. Eric Virey holds a PhD in Optoelectronics from the National Polytechnic Institute of Grenoble. He is currently based in Portland, OR.

**Zine Bouhamri, PhD.** is Team Lead Analyst, Imaging & Display Activities at Yole Développement (Yole). Zine is managing the expansion of the technical expertise and the market know-how of the company. In addition, he actively assists and supports the development of dedicated imaging collection of market & technology reports and monitor as well as custom consulting projects. Prior to Yole, Zine oversaw numerous R&D programs at Aledia. During more than three years, he developed strong technical expertise as well as a detailed understanding of the display industry. He is author and co-author of several papers and patents. Zine Bouhamri holds an Electronics Engineering Degree from the National Polytechnic Institute of Grenoble (FR), one from the Politecnico di Torino (IT), and a Ph.D. in RF & Optoelectronics from Grenoble University (FR).

### About the reports

#### **MicroLED Displays Market, Industry and Technology Trends 2021**

*Strong momentum for MicroLED with progresses on all fronts. Cost is the biggest challenge, but Apple and Samsung are carving paths toward the consumer.* – Performed by Yole Développement

#### **Companies cited:**

3D Micromac (DE) Aixtron (DE), Applied Materials (US), Aledia (FR), Allos Semiconductor (DE), Advanced Powerch (KR), Aerotrans Tech. (TW), AMEC (CN), Apple (US), Aqlaser (KR), ASMPT (SG), AUO (TW), Attolight (CH), BOE (CN), Bolite (TW), CEA-LETI (FR), Charm Engineering (KR), CIOMP (CN), Coherent (US), Comptek (FI), Contrel (TW), Compound Photonics (US), CSOT (CN), Cyberoptics (US), eLux (US), eMagin (US), Enkris (CN), ENNOSTAR (TW), EpiLED (TW), EpiPix (UK), Epistar (TW), Facebook (US), Flex Photonic (CN), Foxconn (TW), Gamma Scientific (US), glö (SE/US), GlobalFoundries (US), Goertek (CN), and more...

#### **MicroLED Displays – Intellectual Property Landscape and Analysis 2021**

*Joining Apple, Samsung, LG, XDisplay, PlayNitride, Facebook and others, newcomers are accelerating microLED patenting activity.* – Performed by Yole Développement

#### **Companies cited:**

Acer, AGC, Aledia, ANK, Aoshi, Apple/LuxVue, Applied Materials, Appotronics, APT, ASTI, AU OPTRONICS, BOE, CEA, CEC Panda, Central South University, Century Display, Changelight, HKC, CIOMP, Comptek, Cooledge, Corning, Cree, Dai Nippon Printing, Elux, EPilight, EPistar, Erised, Facebook/Oculus, Foxconn, Fuzhou University, General Interface Solution, GLO, GlobalFoundries, Goertek, Google/X Development, Guangdong U. of Technology, Gwangju Inst. of Science & Tech., HC Semiteck, HCP Technology, Himax, HiSense, HKC, HKUST, HP, Huawei, Huazhong U. of Science & Tech., IBM, IMEC, Innolux, Intel, ITRI, and more...

### Related reports:

- [Next Generation TV Panel Technology and Market Trends 2020](#)
- [Displays and Optics for AR & VR 2020](#)
- [Microdisplays – Market, Industry and Technology Trends 2020](#)



## Press Release

### About Yole Développement

Founded in 1998, Yole Développement (Yole) has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide... [More](#)

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