

MicroLED IP: startups and newcomers are challenging the heavyweights¹

Joining Apple, Samsung, LG, XDisplay, PlayNitride, Facebook and others, newcomers are accelerating microLED patenting activity.

OUTLINE:

- IP² landscape:
8900+ patents filed by close to 480 organizations now represent a cumulated total of 4093 families selected for the corpus in this study.
40% (1637) of the 4093 patent families have been published in 2020 alone (81% over the last three years).
As of January 2020, 53% of the published patent applications are still pending while 35% has been granted.
- Technology trends:
Yole Développement (Yole) estimates that as of Q1 2021, more than US\$5 billion has already been spent on microLED development.
Commercialization of the first microLED displays is around the corner:
 - Vuzix's new AR glasses featuring microLED microdisplays from JB Display
 - Samsung's modular 110", 99" and 88" TVs with chips from PlayNitride...Efforts to address challenges previously seen as a lower priority are now accelerating.
- Supply chain:
BOE, LG and Samsung have vast numbers of pending applications.
CSOT is not far behind.
Startup PlayNitride is very active, challenging leading panel makers or OEM³s like Facebook.

¹ Extracted from: [MicroLED Displays – Intellectual Property Landscape and Analysis 2021 report](#), Yole Développement, 2021

² IP: Intellectual Property

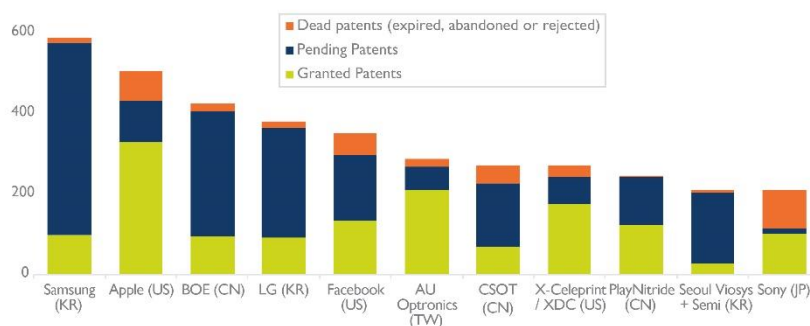
³ OEM: Original Equipment Manufacturer

“We estimate that as of Q1 2021, more than US\$5 billion has already been spent on microLED development. Indeed, 37% have been spent on other company internal R&D and investments, 26% in Apple internal R&D, 24% were investments in startups and 13% have been spent in acquisitions.” asserts **Eric Virey, Principal Analyst, Technology & Market, Displays at Yole Développement (Yole)**. He adds: “Activity is strongly dominated by Chinese companies, followed by Korea. LG and Samsung made strong showings in 2019 and kept up the pace in 2020 in terms of new applications”.

Samsung made a remarkable push with more than 130 new patent families, revolving for the most around its Display division’s self-assembled nanorod LED technology, often referred to as QNED⁴. The patents show the technology maturing, and a commitment to tackle the challenges associated with moving QNED from the lab to the fab.

Top 10 microLED patent holders and legal status (By number of individual patents)

(Source: MicroLED Displays - Intellectual Property Landscape and Analysis 2021 report, Yole Développement, 2021)



In this context, Yole investigates disruptive technologies and related markets in depth, to point out the latest innovations and underline the business opportunities.

Released today, the [MicroLED Displays – Intellectual Property Landscape and Analysis 2021 report](#) takes deep insights into the status of microLED display technologies, identifying emerging technologies and trends for each technology node. Including supply chain, IP leadership, newcomers and major trends, technical analysis, take away and outlook, this study also delivers an in-depth understanding of the ecosystem and main players’ strategies.

What is the status of the IP landscape? Who are the key leaders and emerging players? Who are the suppliers to watch, and what innovative technologies are they working on? Which organizations are developing similar concepts?

Yole presents today its vision of the microLED IP landscape for display applications.

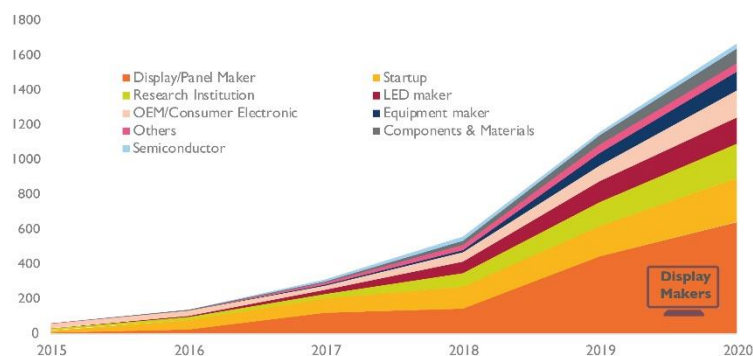
⁴ QNED: Quantum Nano-Emitting Diode. Note that LG uses the same acronym for its LCD TVs that combine quantum dots with a miniLED backlight. In March 2021, the USPTO denied both LG and Samsung separate applications to trademark the term QNED.

As analyzed by Yole’s team in the new MicroLED Displays – Intellectual Property Landscape and Analysis 2021 report, CSOT and BOE led patenting activity in 2019 and remained close to the top in 2020. With similar levels, startup PlayNitride, which raised another US\$50 million in 2020 to expand capacity, plays in the same league as leading panel makers and OEMs. Aledia, which moved into a new R&D facility in 2019 and raised close to US\$95 million in 2020 to build a fab, is also accelerating its IP effort, inching closer to historical leaders such as XDisplay. Panel makers that were missing have now entered our patent corpus including Japan Display, CEC Panda, HKC and Sakai Display.

According to **Eric Virey**: “The field is getting crowded but there is still time for ambitious newcomers to build credible portfolios. In late 2019 and early 2020, Konka and Visionox announced plans to invest US\$365 million and US\$175 million respectively in mini and microLED development and production ramp ups. Konka only filed its first microLED patent in 2019 and Visionox in 2017, but both already have sizable portfolios of pending applications, some showing a surprising level of maturity”.

Time evolution of microLED patent publication by company type (In number of patent families)

(Source: MicroLED Displays - Intellectual Property Landscape and Analysis 2021 report, Yole Développement, 2021)



Activity at Apple peaked in 2017. However, the quality and details of new applications shows how far the company’s technology has advanced. The acquisition of Tesoro indicates a focus that is shift or expansion toward enabling volume production rather than fundamental technology development. TSMC, which is expected to be one of Apple’s key partners, appears for the first time in Yole’s corpus...

All year long, Yole Développement publishes numerous Display-related reports and monitors. In addition, experts realize various key presentations and organize key conferences.

Make sure to be aware of the latest news coming from the industry and get an overview of our activities, including interviews with leading companies and more on i-Micronews. Stay tuned!



Press Release

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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 has spoken in more than 50 industry conferences over the last 10 years and has been interviewed or quoted in multiple media including: The Wall Street Journal, CNN, Fox News, CNBC, Bloomberg, Financial Review, Forbes, Technology Review, etc. Prior to joining Yole, Eric held R&D, engineering, manufacturing and marketing positions with Fortune 500 Company Saint-Gobain in France and the United States. Eric received a PhD in Optoelectronics from the National Polytechnic Institute of Grenoble.

The market research and marketing strategy company Yole Développement (Yole), has performed this report with Nicolas Baron from the patent and technology intelligence company [Knowmade](#).

Nicolas Baron, PhD. is CEO and co-Founder of Knowmade. He manages the company's development and strategic direction, and personally leads the Electronics and Telecom department. He holds a PhD in Physics from the University of Nice Sophia-Antipolis and a master's degree in Intellectual Property Strategies and Innovation from the European Institute for Enterprise and Intellectual Property (IEEPI Strasbourg), France.

About the report

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 Semitek; Hcp Technology; Himax; Hisense; Hkc; Hkust; Hp; Huawei; Huazhong U. Of Science & Tech.; Ibm; Imec; Innolux; Intel; Itri; Jade Bird Display; Japan Display; Kaist; Kimm; Konka; Kookmin University; Kopti; Korea Advanced Nano Fab Center; Kyocera; LG;, and more...

Related reports:

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

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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