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## The promising future of LEDs

**LYON, France – March 19, 2015** – *“The LED market is a complex but promising market,”* comments **Pars Mukish, Business Unit Manager, LED, OLED and Sapphire at [Yole Développement \(Yole\)](#)**. In 2015, companies are not relying on more technical breakthroughs, except at the LED module level, where integration remains an important issue. *“However, there is still overcapacity,”* cautions Mukish. *“This is causing many changes in the supply chain, first at the chip level, then at the module/system level. The [spin-off Royal Philips announced in July 2014 of its LED business](#), which grew from its acquisition of Lumileds in 2005, is one example.”*

The LED industry’s complexity results from numerous technical issues, its many players and a multitude of lighting applications. Its promise comes thanks to especially large volume lighting opportunities, stresses Yole in its latest reports. Yole, the ‘More than Moore’ market research and strategy consulting company, foresees a global business reaching almost \$516 million at the system level by 2016. (Source: [LED in road and street lighting report](#), Jul. 2013, Yole Développement & Luxfit)

Today, LED technology’s average penetration rate is from 10-20% depending on geographic area. Each country has its own policy and has set up different measures to help LED implementation. For example, in Japan, penetration has reached 30% thanks to government involvement.

Governmental measures are clearly welcome, as the technology is still considered expensive by the public. *“Even though we saw a real breakthrough for LED technology from 2006 to 2014, upfront LED costs are still high compared to existing technologies,”* explains Mukish. *“Today, the real growth is in external lighting applications where LED technology is partially implemented. Commercial and industrial lighting players are also considering LED technology but today implementation is still developing.”*

In 2015, technical issues are different to previous years. They are mainly located at the LED module level. LED market leaders are therefore developing answers to packaging and integration needs. In the report entitled [LED Packaging Technology and Market trends](#) (Sept. 2014, Yole Développement), Yole has detailed the positive impact of advanced packaging technologies on LED manufacturing, especially LED packaging materials.

Mukish adds: *“In 2015, we clearly see the value moving later in the supply chain. It was initially at the LED chip level, but we have identified strong investments at the module and system level to develop smart solutions in terms of packaging technologies and functionalities.”* In this context, Yole is focusing its 2015 activities on analyzing new technologies at the LED module level. The company is investigating the impact on the supply chain and determining key players’ strategies (LED module, related technologies and equipment report: [available mid-2015](#)).



Mukish is newly appointed to the management of Yole’s business in the LED, OLED and Sapphire areas. He is in charge of developing consulting activities and producing technology and market analysis at Yole.

Using his strong expertise in LED and compound semiconductor materials sectors and his past experience at the French Commissariat à l’Energie

Atomique (CEA) research center, Pars, with his team, will analyze disruptive technologies and emerging markets. They are providing high added-value studies by combining two approaches: “Bottom-up”, from technology to final applications; and “Top-down” taking into account business opportunities from innovative technologies.

The team also collaborates with both of Yole’s sister companies, [System Plus Consulting](#) and [KnowMade](#) to complete its understanding and knowledge of the industry:

- System Plus Consulting performs reverse engineering and costing analysis. Its engineers explore lighting systems and modules to identify and analyze technologies developed by LED makers. In this process, they collect accurate and powerful information about LED manufacturing, packaging and integration and evaluate the related costs.
- In parallel, KnowMade is focused on Intellectual Property (IP) analysis. This start-up identifies key players, their positioning all along the supply chain and potential interactions between them, through their patent portfolio analysis. KnowMade’s analysts also determine the knowledge of each player and

provide a patent landscape related to a technology. In 2012, Yole and KnowMade collaborated to investigate the LED phosphor industry. An update of this analysis plus a new patent analysis dedicated to GaN devices will be available mid-2015. Detailed information is coming soon on i-micronews.

All through 2015, Yole will pursue the development of its expertise in the LED area. The consulting company will explore new hot topics such as OLED, UV LED, sapphire or high purity alumina (HPA). With that knowledge, Mukish and his team will work to understand technological evolution, related breakthroughs and identify emerging markets. *“We encourage you to interact with our team during key trade shows and conference (see the [2015 program selected by Yole’s analysts](#)) and visit our website, i-micronews, to discover our analysis as well as the latest news from the LED & Compound Semiconductor industry”,* concludes Mukish.



#### About the [UV LED - Technology, Manufacturing and Application Trends](#) report

*Beyond simply replacing mercury lamps, UV LEDs are finding their way into new applications*

Publication date: Feb. 2015 – Detailed description: [Here](#)



#### About the [LED Packaging Technology and Market Trends 2014](#) report

*Moving toward further cost reduction and new technology with Flip Chip and Chip Scale Packages changing the material / equipment market and the supply chain*

Publication date: Sep. 2014 – Detailed description: [Here](#)



#### About the [Sapphire Applications & Market: from LED to Consumer Electronic](#) report

*Apple saved the sapphire industry in 2013 and could transform it in 2014. Will the revolution happen?*

Publication date: Aug. 2014 – Detailed description: [Here](#)



#### About the [LED Front-End Manufacturing Trends](#) report

*A comprehensive survey of LED Front-End manufacturing, covering main process steps and technological trends.*

Publication date: May 2014- Detailed description: [Here](#)



#### About the [LED Front-End Equipment Market](#) report

*A comprehensive survey of the LED Front-End equipment business, covering main trends and industry by process step, and market metrics.*

Publication date: Apr.2014 – Detailed description: [Here](#)

And coming soon: LED Phosphors (Publication date: Q1, 2015) – High Purity Alumina (HPA – Publication date: Q3, 2015) and also in 2015 LED Modules and OLED for lighting applications.

**For further information about our reports, please contact David Jourdan ([jourdan@yole.fr](mailto:jourdan@yole.fr)).**

#### About Yole Développement – [www.yole.fr](http://www.yole.fr) / [www.i-micronews.com](http://www.i-micronews.com)

Founded in 1998, Yole Développement has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole Développement group has expanded to include more than 50 collaborators worldwide covering MEMS, Compound Semiconductors, LED, Image Sensors, Optoelectronics, Microfluidics & Medical, Photovoltaics, Advanced Packaging, Manufacturing, Nanomaterials and Power Electronics. The group supports industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to develop their business.

#### CONSULTING

- Market data & research, marketing analysis
- Technology analysis
- Reverse engineering & costing services
- Strategy consulting
- Patent analysis

#### FINANCIAL SERVICES

- Mergers & Acquisitions
- Due diligence
- Fundraising

More information on [www.yolefinance.com](http://www.yolefinance.com)

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