FOR IMMEDIATE RELEASE:
Automotive lighting: new SSL technologies integration is transforming the industry

LYON, France – November 29, 2018: “The growth of the automotive lighting market is driven by natural LED cost erosion coupled with standardization and optimization of LED modules, which result in more vehicles equipped with this technology”, asserts Pars Mukish, Business Unit Manager, SSL and Display activities at Yole Développement (Yole). Indeed, whereas SSL technologies represented 57% of automotive lighting value in 2017, this share is likely to reach an impressive 85% by 2023… According to the market research and strategy consulting company, Yole, the automotive lighting market totaled US$27.4 billion in 2017 and is expected to reach US$37.3 billion in 2023 at a 5.3% CAGR during this period.

Analysts from the Photonics, Sensing & Display team release their annual automotive lighting report: the Automotive Lighting: Technology, Industry and Market Trends report presents a complete overview of new lighting technologies and AFLS, providing details regarding benefits and drawbacks, integration status, and development roadmaps. Under this update, they give insights into the future of automotive lighting with analysis on synergies with ADAS.

Yole investigates the automotive sector for a while, covering numerous industries and technologies, from sensing to lighting, including RF electronics and advanced packaging. The company continuously improves its expertise and enlarges it with new topics of investigation, covering technical innovations, mergers and acquisitions and market trends. Today, Yole’s team is mixing a “bottom-up” methodology, taking into account business opportunities of innovative

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1 SSL: Solid-State Lighting
2 CAGR: Compound Annual Growth Rate
3 AFLS: Advanced Front Lighting Systems
4 ADAS: Autonomous Driver Assistance Systems
technologies and a “top-down” analysis, more focused on the market needs from the applications side. The automotive lighting report is one of the key results of this approach.

The Solid-State Lighting & Display team offers you today an overview of the latest technology and market trends dedicated to the automotive lighting sector.

With the integration of LED\(^5\) technology, lighting has evolved from a basic and functional feature to a distinctive feature with high-value potential in automotive. Indeed, LED technology has given manufacturers the opportunity for strong differentiation via lighting design and additional functionalities. “This is particularly true for exterior lighting, which is profoundly mutating in terms of both technology and supply chain,” comments Pierrick Boulay, Technology & Market Analyst part of the SSL & Display team at Yole. And he adds: “The integration of new SSL technologies is transforming automotive front lighting and RCL\(^6\) systems and their applications, offering more design flexibility, increased efficacy, and intelligent functionalities.”

LEDs are rapidly gaining popularity as their cost decreases and efficiency, luminance and package size improves. For example, full LED headlamps that first saw commercialization in 2008 on luxury cars like the V10 Audi R8 have since penetrated the compact, or C-segment, vehicle market in 2012, with the new Seat Leon, and are now being commercialized in emerging markets. Nowadays, nearly all car maker and Tier-1 part suppliers have developed full LED-based headlamp systems and such technology is a must-have in the C and also the D – compact executive car – automotive segments.

Laser and OLED\(^7\) sources are still emerging technologies but could also support the development of new functionalities:

- Laser-based headlamps could enable long-distance night vision, up to 600 meters, or be coupled with DMDs\(^8\) to provide high resolution lighting systems, up to 1M pixels.
- OLED RCLs could initiate a design shift from 2D to 3D light sources, made possible by the nature of the OLED device itself…

Automotive lighting devices like headlamps are therefore becoming more and more complex. They require specific know-how and testing equipment to integrate innovative technologies in a reliable manner. Integrating high current LED with all thermal and reliability considerations, preventing condensation to appear or being able to homologate highly innovative devices are, among other, challenges. Under this context, car makers and suppliers are so facing as it has never happened in the past.

\(^{1}\) LED : Light Emitting Diode  
\(^{2}\) RCL : Rear Combination Lighting  
\(^{3}\) OLED : Organic LED  
\(^{4}\) DMD : Digital Micromirror Device
« Strong capabilities in optical design and simulation, thermal management, electronics and software design, system integration are key to any headlamp maker who wants to keep the pace of this paradigm change » says Joël Thomé, Head of PISEO, part of Yole Group of Companies.

As a relevant center of expertise dedicated to innovative optical systems design and characterization, PISEO has a long lasting experience in LED integration for numerous applications including based on UV, VIS and IR illumination and detection. The company is already active for many years in the field of transportation lighting. Its team provides, thanks to its experts and accredited test lab, a strong innovative support to several tier 1 and 2 suppliers.

In the future, technical innovations for automotive lighting applications look also really promising. According to Yole’s analysts, digital lighting will be the next revolution. Therefore it is a key area of investigation for the automotive lighting supply chain. And several new technologies/systems have been already investigated. It includes: DMD/DLP\(^9\), laser scanners, LCDs\(^{10}\), and micro-/mini-LED.

“An interesting fact is that such lighting systems are providing ever more synergy with projection/display systems as their function is evolving toward communication, like projecting information onto the road,” comments Martin Vallo, PhD, Technology & Market Analyst, part of the SSL & Display team at Yole. And new parameters now have to be taken into account for related developments, such as resolution, FOV\(^{11}\) and pixel density…

A detailed description of this report is now available on i-micronews.com, SSL reports section.

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\(^9\) DLP : Digital Light Projection  
\(^{10}\) LCD : Liquid Crystal Displays  
\(^{11}\) FOV : Field of View
ABOUT THE REPORT:

Automotive Lighting: Technology, Industry and Market Trends
Automotive lighting is becoming the new photonic hub. – Produced by Yole Développement (Yole).

Companies cited in the report:
3M, Abarth, Acura, Alfa Romeo, AMG, Apple, Aston Martin, Audi, Autoliv, Automotive Lighting, Avago, Avis, Basf, Bentley, BlaBlaCar, BMW, Bolloré, Bosch, Brighttek Optoelectronic, Bugatti, Buick, BYD, Cadillac, Chevrolet, Chrylser, Cisco, Citizen Electronic, Citroen, Clean Technology Leader, CML Innovative Technologies, CnLight, Continental, Covestro, Cree, Dacia, Daihatsu, Daimler, Datsun, Delphi, Denso, Depo Auto Parts, Dodge...

Full list

Authors:

- **Pars Mukish** holds a master degree in Materials Science & Polymers (ITECH - France) and a master degree in Innovation & Technology Management (EM Lyon - France). Since 2015, Pars has taken on responsibility for developing SSL and Display activities as Business Unit Manager at Yole Développement (Yole). Pars is part of the Photonics, Sensing & Display division at Yole. Previously, he has worked as Marketing Analyst and Techno-Economic Analyst for several years at the CEA (French Research Center).

- **Martin Vallo**, PhD serves as a Technology & Market Analyst specialized in solid state lighting technologies, within the Photonics, Sensing & Display division at Yole Développement (Yole). With 9 years’ experience within semiconductor technology, Martin is involved today in the development of technology & market reports as well as the production of custom consulting projects at Yole. Prior his mission at Yole, he worked at CEA (Grenoble, France), with a mission focused on the epitaxial growth of InGaN/GaN core shell nanowire LEDs by MOCVD and their characterization for highly flexible photonic devices. Martin graduated from Academy of Sciences, Institute of Electrical Engineering (Slovakia) with an engineering degree in III nitride semiconductors.

- As part of the Photonics, Sensing & Display division at Yole Développement (Yole), **Pierrick Boulay** works as Market and Technology Analyst in the fields of LED, OLED and Lighting Systems to carry out technical, economic and marketing analysis. He has experience in both LED lighting (general lighting, automotive lighting…) and OLED lighting. In the past, he has mostly worked in R&D department for LED lighting applications.

Pierrick holds a master degree in Electronics (ESEO - France).

ABOUT PISEO

PISEO is an independent center of expertise specialized in the integration of photonic technologies (LED, VCSEL, Laser diods, image sensors, phosphors, optical materials...) and their applications. Endowed with a strong industrial crop, the company performs consulting, testing and training activities in the field of optical systems for all business sectors. More information on www.piseo.fr; Contact: Joël Thomé, (thome.joel@piseo.fr)

ABOUT YOLE DEVELOPPEMENT

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 covering MEMS & Sensors - Imaging - Medical Technologies - Compound Semiconductors - RF Electronics - Solid State Lighting - Displays - Photonics - Power Electronics - Batteries & Energy Management - Advanced Packaging - Semiconductor Manufacturing - Software & Computing - Memory and more...

The “More than Moore” market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. For more information, visit www.yole.fr and follow Yole on LinkedIn and Twitter.
Consulting & Financial Services: Jean-Christophe Eloy (eloy@yole.fr)
Reports: David Jourdan (jourdan@yole.fr)

Yole Développement, System Plus Consulting, Knowmade, PISEO and Blumorpho are part of Yole Group of Companies. Yole Group of Companies - Press Relations & Corporate Communication: Sandrine Leroy (leroy@yole.fr).

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