ISA
International SSL Alliance

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ISA
International SSL Alliance

4E
Solid State Lighting
SSL Annex

ISA
Global SSL Award of Outstanding Achievement
2023

Solid state lighting (SSL) is a new successful lighting revolution after incandescent lamp and fluorescent lamp, not only its low carbon emission and provide comfortable lighting, but also it is an important path to improve people's livelihood and to contribute sustainable development. ISA has been seeking to foster and stimulate this great lighting revolution, and is proud of being able to contribute to the promotion of this industry and its sustainable development.

The course from creation, innovation to startup of SSL and to the formation of an influential industry and to get final recognition and acceptance worldwide is also a process of the cultivation and building of the "ecosystem" of SSL. This "ecosystem" includes researchers, government policy makers, manufacturers, designers, standard setters, inspectors, marketing, ultimate users, etc. Building of this "ecosystem" requires the joint efforts of tens of thousands of individuals and collectives, as well as international communications and cooperations among SSL peers .

Without the deep insight and foresight of scientists for the unknown of the humankind, assiduous work and fortitudinous spirit of engineers and the risk spirit and unremitting efforts of entrepreneurs, we cannot enjoy the well-being brought by SSL. Also, without the guidance, support and service of relevant government departments to this "ecosystem" , this achievement cannot be applied universally so quickly. When we review and declare this history, we should remember the outstanding individuals, groups and organizations creating this history.

Just for the above reason, ISA started to launch the "Global SSL Award of Outstanding Achievement" from 2013 to pay the utmost respect to and manifest these outstanding contributors, and also to inspire more and more individuals and groups to devote to this great cause, to move forward the history with their knowledge and innovation, to create more exciting results, to make contributions to human beings and to benefit all mankind.

Jianlin Cao

Jianlin Cao
President of ISA

ISA Introduction

ISA is a non-for-profit international organization consists of regional alliances, association/society, leading companies and renowned universities in global Solid State Lighting (SSL) field.

The Business of ISA members have covered the whole SSL value chain of upstream, middle stream and downstream of global SSL industry such as epitaxy, packaging application, materials and equipment, design system integration and testing etc.

The currently ISA 82 members, representing more than 4000 individuals & organizations includes major players (such as Signify, Osram, Smsung, GE Lighting, Cree, Veeco, AIXTRON etc.). The output of which covers more than 70% that of global SSL industry.

The ISA Board of Advisers consists of leading experts and academic "Founder" level experts, such as the inventors of blue LED, yellow LED, Red LED, and OLED. Amongst Professor Shuji Nakamura, the Laureate of Nobel Prize in Physics in 2014, is the Co-Chair of ISA Board of Advisors (BOA) and Professor Hiroshi Amano, the Laureate of the Nobel Prize in Physics in 2014 is the member of ISA BOA.

The major works of ISA are: provide services to promote the development and application of global SSL, standardization, annually Global SSL Industry Report, annually SSL Awards, promote international, national and regional cooperation on SSL, etc.

The Mission of ISA

Cooperation with the global resources and efforts, ISA looks forward to fostering a more appropriate "eco-system" for the health development of the global SSL and its application. Echo the needs of the society with more added value services to ISA members. Strive to improve people's living and contribute a sustainable human society.

ISA
International SSL Alliance

Global SSL Award of Outstanding Achievement

Mission statement

The "Global SSL Award of Outstanding Achievement" aims to recognize outstanding achievement by individuals or organizations to global SSL development in particular for Science and Technology & Standardization & Policy & Application & Industry. This award is one of the highest honor to recognize contribution and achievement in global SSL field.

Categories of the Awards

1. Award of Outstanding Achievement on SSL Science and Technology
2. Award of Outstanding Achievement on SSL Standardization
3. Award of Outstanding Achievement on SSL Policy
4. Award of Outstanding Achievement on SSL Application
5. Award of Outstanding Achievement on SSL Industry

Recurrence

The Award will be made annually and continue identifying a certain number of outstanding achievements according to the nomination. The Council of Management of ISA reserves the right not to make an award in any year or to make more than one.

Any organization in the SSL industry can nominate.

Statement

Global SSL Award of Outstanding Achievement

- Accept nominations for excellence around the world
- Judged by worldwide authoritative experts
- Widely promoted with global impacts
- Remember the achievements and manifest the contributions

Global SSL Award of Outstanding Achievement

Prof. András Poppe

Brief introduction

András Poppe obtained his MSc degree in electrical engineering in 1986, and in 1996 his PhD from the Budapest University of Technology and Economics (BME), Hungary. He has been with BME's Department of Electron Devices since 1986. Currently he is a full time professor and he is heading the department. In 1989-1990, he was a guest researcher at IMEC (Leuven, Belgium). In 1997 he was one of the co-founders of MicReD (now pat of SIEMENS). His research field is multi-domain characterization (testing, modelling & simulation) of semiconductor devices, with special attention to SSL LEDs.

He was involved in dozens of national and international collaborative research projects (such EU projects Fast2Light, NANOPACK, THERMINATOR, NANOTHERM, Delphi4LED) projects; currently he leads the modelling work package of the AI-TWILIGHT project). He is actively involved in the JEDEC JC15 and CIE TC2-91 standardization committees.

Outstanding Achievements Brief

András Poppe is a full time professor at the Budapest University of Technology and Economics, Faculty of Electrical Engineering and Informatics, Department of Electron Devices. By now he is a world-wide acknowledged expert in thermal engineering, specialized in thermal issues of power LEDs. He has expertise both in physical testing (thermal, optical) and in modelling & simulation of LED packages. He initiated the concept of a laboratory test setup capably of measuring the thermal, electrical and light-output characteristics of LED packages and through his former spin-off company introduced this solution to the market. Both as a university professor and as a product manager of the LED testing solutions he widely disseminated this solution in the SSL community. He was the first to publish a Spice compatible multi-domain LED model, with a parameter set directly extracted from the results of isothermally measured electrical and light output characteristics of LED packages. The latest version of his model became the essential part of an Industry 4.0-like SSL product development workflow proposed by the Delphi4LED project of the EU and being used by Signify for multi-objective product optimization. He is active in different national and international professional SSL related bodies, e.g. currently he is the representative of Hungary in CIE's General Assembly.

Starting from his PhD (1996) throughout his career he has been active in multi-domain characterization (testing, modelling and simulation) of semiconductor devices in general. Starting with electro-thermal simulation of MOS transistors on device level using molecular dynamics methods, through electro-thermal simulation of analog IC-s and logi-thermal simulation of digital IC-s on gate and system level; with an emphasis of extending the standard electrical models with the thermal aspect and putting emphasis on automatically generating the compact thermal model of the system substrate.

In 1997 he was one of the co-founders of MicReD Ltd (today part of SIEMENS Digital Industry Simulation and Test Solutions) best known for their de-facto industry standard thermal transient test equipment called T3Ster. András Poppe started dealing with LED characterization 2003. He initiated the development of the first, combined thermal and radiometric/photometric testing solution of LEDs, resulting in the launch of a commercial product in 2005, known as the TeraLED equipment, an extension of the T3Ster equipment, allowing consistent measurement of the electrical, thermal and light output characteristics of LED packages, see Figure 1. This solution became a technical and commercial success, being used by the leading companies and development laboratories of the SSL industry world-wide; combined with modelling and simulation winning the LEDs Magazine 2015 Saphire Award in the category of SSL tools and test, see Figure 2.

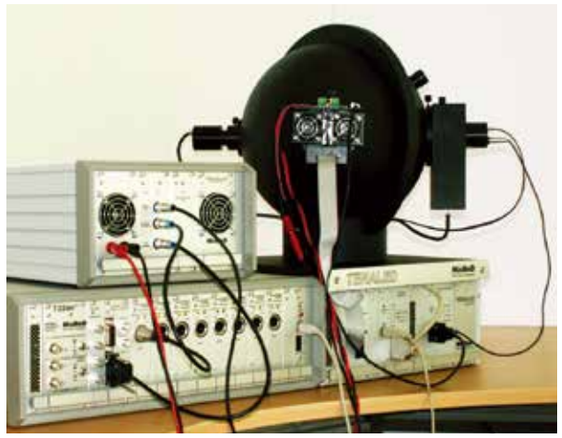
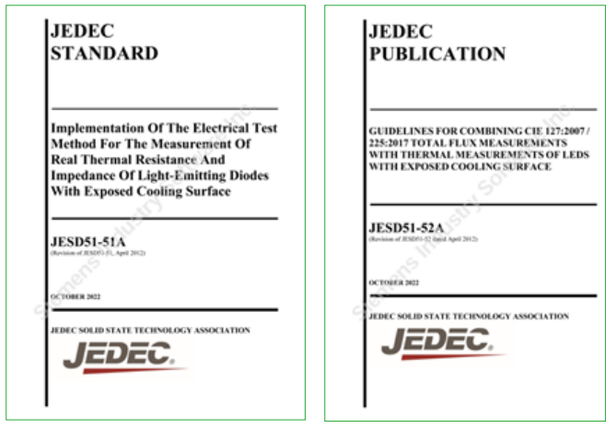


Figure 1: The combined T3Ster + TeraLED LED package testing hardware

Figure 2: One of the winners of the 2015 LEDs Magazine Saphire Awards was his T3Ster+TeraLED solution completed LED modelling and simulation options

Between 2008 and 2013, besides his academic work, András Poppe worked as product manager of the LED testing solutions at Mentor Graphics MicReD division (former MicReD Ltd, now part of SIEMEND DI STS). In this capability he championed the development and the publication of JEDEC's LED package thermal testing standards (JESD51-50, 51-51, 51-52 and 51-53), first launched in 2012. He also championed the 2022 update of these documents, incorporating some of the latest findings of the Delphi4LED H2020 ECSEL R&D project of the EU (Figure 3).


JEDEC
STANDARD

Implementation Of The Electrical Test Method For The Measurement Of Real Thermal Resistance And Impedance Of Light-Emitting Diodes With Exposed Cooling Surface

JESD51-51A

OCTOBER 2022

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

JEDEC

JEDEC
PUBLICATION

GUIDELINES FOR COMBINING CIE 127:2007 / 225:2017 TOTAL FLUX MEASUREMENTS WITH THERMAL MEASUREMENTS OF LEDS WITH EXPOSED COOLING SURFACE

JESD51-52A

OCTOBER 2022

JEDEC SOLID STATE TECHNOLOGY ASSOCIATION

JEDEC

Figure 3: Frontpage copies of the 2022 updates of the JESD51-51 and JESD51-52 standards of JEDEC

He widely disseminated the information on these new standards at professional development courses at scientific events (like SEMI-THERM 2013 and EuroSime 2013) and at conferences, in different professional magazines and book chapters.

Besides being an active member of the JEDEC JC15 committee on thermal standards of packaged semiconductor devices, with his thermal expertise, especially on thermal management of LED applications he also contributed to the work of various technical committees of Division 2 of CIE, co-authoring four CIE technical reports on optical measurements of LEDs.

His 2012 publication on multi-domain modelling of LEDs was a milestone in creating Spice-like models of power LEDs, capable of describing the electrical, thermal and light-output properties and their mutual dependence in a consistent way in industry standard simulation environments, such as a Spice-like circuit simulator. The model is based on the concept of splitting the LED's forward current into components flowing through two parallel diodes (see Figure 4), one modelling light generation (associated with charge carriers recombining in radiative manner) and another one responsible for heat generation (associated with charge carriers recombining through non-radiative processes). The voltage dependence of both the radiative and the dissipative current components closely follow Shockley's diode model. The radiative current component can be directly derived from the total radiant flux of the LED package, measured in the combined T3Ster-TeraLED test setup (Figure 1).

The significance of the model was acknowledged by the thermal community by the 2012 Harvey Rosten Award of Excellence (Figure 6) at the 2013 IEEE SEMI-THERM Semiconductor Thermal Management Symposium in San Jose, CA, USA . The initial model evolved into its present form, in multiple stages. Currently it is available both as a generic Spice netlist (Figure 5) and as a set of equations embedded into a complex 3D numerical simulation environment.

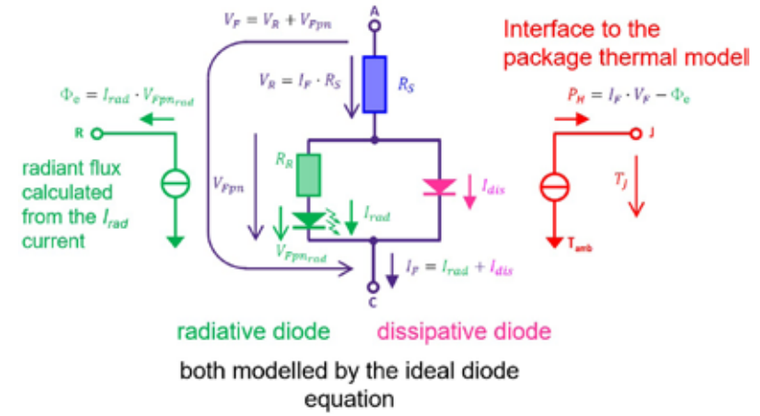


Figure 4: The principle of the multi-domain LED model proposed by A. Poppe and his team, according to the latest version of the model [41].

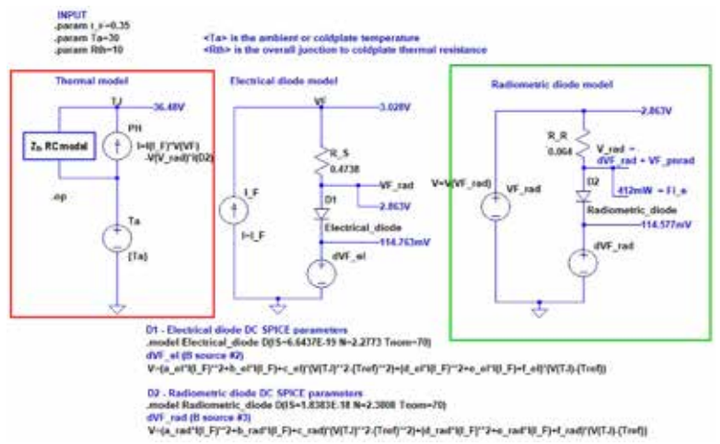


Figure 5: The generic Spice network implementation of the multi-domain LED model shown in Figure 4,as per the latest practical implementation of the model [41].

Figure 6: The 2012 Harvey Rosten Award of Excellence, in acknowledgement of the 2012 conference paper entitled "A step forward in multi-domain modeling of power LEDs"

Figure 7: The 2017 Harvey Rosten Award of Excellence, in acknowledgement of the 2017 conference paper entitled "A step forward in multi-domain modeling of power LEDs"

The model was successfully used to design the control scheme for a commercial streetlighting luminaire to assure temperature compensated constant light output, as well as its latest version became part of the complete, Industry 4.0 like LED luminaire development workflow proposed by the Delphi4LED project. The commercial/ industrial benefits of using the multi-domain LED model were evaluated and quantified through real-life examples, resulting in a 30-40% reduction of LED luminaire development costs and time.

Figure 8: Handing over the 2017 Harvey Rosten Award of Excellence, in acknowledgement of the 2017 conference paper entitled "A step forward in multi-domain modeling of power LEDs" on 22 March 2018 in San Jose, CA, USA, at the IEEE SEMI-THERM symposium. From left to right: Bruce Guenin (selection committee, past chairman of the JEDEC JC15 technical committee, András Poppe, Gusztáv Hantos and János Hegedüs. Source of image: https://www.facebook.com/photo/?fbid=2021362307878072&set=pcb.2021363037877999

Besides using the model as part of a Spice netlist aimed at system level analysis the model was built into a complex 3D simulation environment, allowing the multi-domain simulation of large area devices such as modern CoB LEDs.

The next major step in multi-domain modelling of LED packages was the idea of extending the model with LED ageing, e.g. describing the effect of elapsed operating manifesting in luminous flux depreciation. The idea was evaluated for street-lighting applications with constant light output and was published in a conference paper titled "Lifetime Iso-flux Control of LED based Light Sources". The international thermal community found this paper also a significant contribution to the thermal and reliability issues of SSL products and acknowledged it by the 2017 Harvey Rosten Award of Excellence, see Figure 7 and Figure 8.

The initial idea of was later further elaborated and resulted in describing the aging time dependence of the parameters of the baseline model, corresponding to standard, LM80 compliant aging conditions.

The idea of inclusion the effect of ageing in the chip level multi-domain LED model resulted in setting up a new European research consortium and launching the AI-TWILIGHT H2020 ECSEL project, aiming to address ageing in the digital twins of LED-based luminaires. András Poppe is one of the key experts in AI-TWILIGHT, leading the modelling and simulation work package of the project. AI-TWILIGHT is a follow up-project of Delphi4LED in multiple aspects, extending the earlier concepts of Delphi4LED in many ways, e.g. compact modelling of to LED drivers, modelling of mechanical degradation of LED packages due to thermo-mechanical stresses and also aiming to provide prognostics features for SSL products, such as prediction of the remaining useful lifetime. The research team of Prof. Poppe published their first related results in.

Besides the business and research achievements his exceptional publication activity deserves mentioning. András Poppe has over 300 papers published in journals and in proceedings of different conferences (e.g. IEEE, SPIE, CIE), receiving 1600+ independent citations so far. He co-edited two books published by Springer [34], [61] (see Figure 9), both having multiple chapters co-authored by A. Poppe. (List of his related publications see in Appendix).

As a university professor, he incorporates his latest research results into his regular courses such as his elective subject entitled Application of Power LEDs.

As an internationally acknowledged thermal expert of SSL, he was invited speaker at LED-events including LEDexpo (South Korea), LS14, 15 and 16 conferences (Italy, Japan, UK), LEDForum (France), LED Professional Symposium (Austria), Strategies in Light (USA).

Figure 9: Covers of the two Springer books co-edited by A. Poppe [34], [61]

• Juries' Comments

An outstanding achievement over a sustained period of both individual discovery and joint research that has led to internationally accepted models, techniques and standards relating to SSL products.

Impressive academic record. Heavily involved in LED testing packages including thermal modelling as well as radiative properties. Contributed to a large number of projects and models.

The candidate is a world leader in thermal management of LED devices and systems. His theoretic models and novel experimental setup have been widely adopted by global leading LED companies and research institutions. His effort and achievements are essential for future development of LED technologies and applications.

Prof. Poppe has been making excellent contribution to better thermal solutions of LED components and systems, which will be essential for future LED technologies and applications.

Global SSL Award of Outstanding Achievement

International Energy Agency's Implementing Agreement on Energy Efficient End-Use Equipment, Solid State Lighting Annex (IEA 4E SSL Annex)

Brief introduction

The International Energy Agency (IEA) Implementing Agreement on Energy Efficient End-Use Equipment (4E) was created by thirteen countries in 2008 to provide support to member governments when formulating effective policies that increase production and trade in energy efficient end-use equipment. The solid-state lighting (SSL) Annex was established under the IEA 4E and is one of its main collaborative research and development activities. The SSL Annex supports countries seeking to implement quality assurance programmes for SSL lighting. Founded in 2010 by the governments of Australia, Denmark, France, Japan, The Netherlands, the Republic of Korea, Sweden, the UK and the USA, with China working as an expert member of the SSL Annex, the SSL Annex supports activities at the national level. The Annex's activities address some of the challenges with SSL, for example, a lack of reliable, internationally-recognised test methods for measuring SSL quality and limited information for policy makers on product quality parameters.

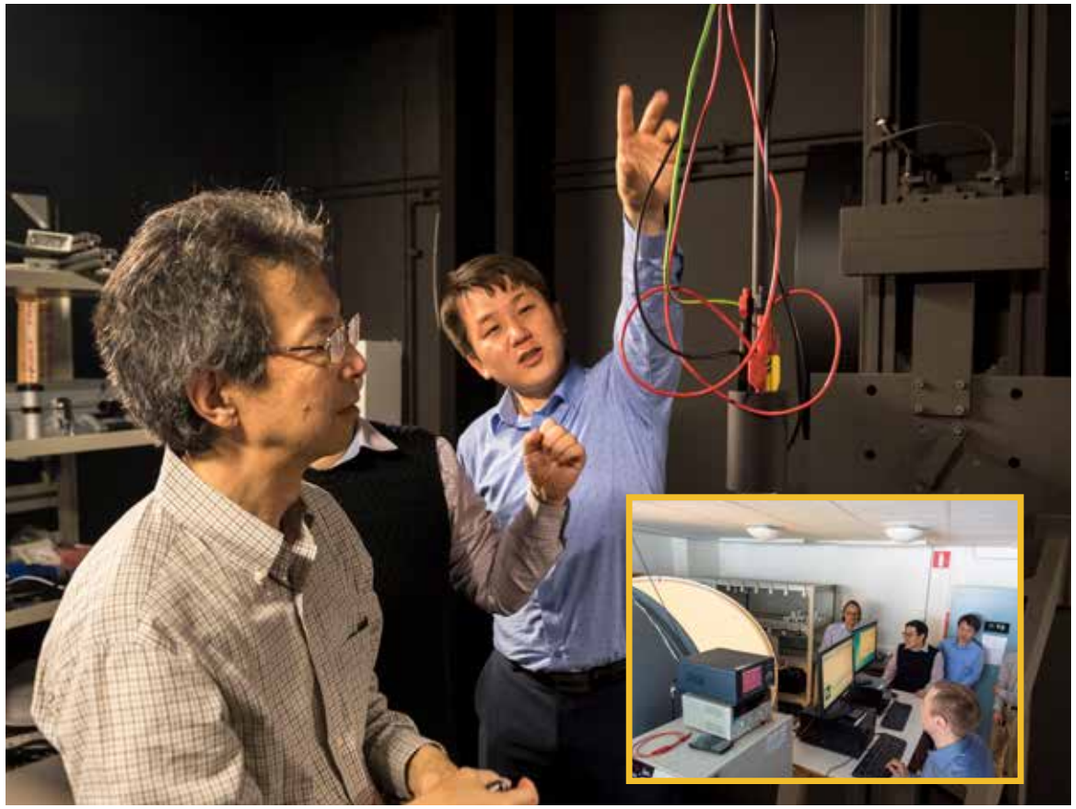
The SSL Annex is overseen by the Management Committee, which is made up of government representatives from each member country, ensuring that the Annex's work is representative of its member governments' priorities. The Management Committee oversees all decisions and actions taken by the Annex, as well as providing strategic direction on future work.

Under the Management Committee are the SSL Annex Experts who are a group of researchers and technical

experts from around the world. Each of the SSL Annex technical experts have, on the average, over 20 to 30 years of experience in lighting, covering lighting design, manufacturing, marketing, sales, and regulatory and supportive policy development. The experts are involved in the technical consultations and projects conducted by the Annex and are available to all the member countries. The Experts meet twice yearly to review progress, work together and set tasks for the next six months. The SSL Annex Experts consists of more than 15 individuals, including Steve Coyne, Gillian Isoardi and Sarah Loughran (Australia), Jennifer Veitch (Canada), Carsten Dam-Hansen and Casper Kofod (Denmark), Christophe Martinsons and Georges Zissis (France), Jun-Seok Oh and Sangkyoo Jeon (Korea), Peter Bennich, Jonas Pettersson, Tobias Lund and Jorgen Eriksson (Sweden), Cosmin Ticleanu (UK) and Yoshi Ohno (USA).

The SSL Annex serves as an excellent case study for the benefits of international cooperation around the introduction of a new, energy-efficient technology. The output of the Annex collaboration can be used, for

example, to establish national government policy on SSL quality and performance levels while also benefitting industry by establishing harmonisation across national programmes and requirements (avoiding the costly problem of a patchwork of different regulations). Ultimately, the SSL Annex serves as a forum to exchange ideas, test results, market transformation initiatives and challenges around regulations and enforcement challenges. The goal of all of this work is to accelerate global market adoption of SSL technology. For more information on the SSL Annex, please visit our website.



Outstanding Achievements Brief

The SSL Annex has worked for over a decade to accelerate the global transition toward solid-state lighting. The SSL Annex has developed and published information and analysis that is highly relevant for market transformation programme managers and government policy experts, while simultaneously working to support standardisation and metrology efforts and engaging with the lighting community. This section presents some illustrative examples of the many achievements and engagements that have taken place over the last decade across four themes: (1) SSL testing, metrics and standards; (2) Smart lighting, digitalisation and connectivity; (3) Public health, productivity and environmental impacts; and (4) SSL product quality and performance. In sharing our research on these themes with the global lighting community, the SSL Annex has published more than 50 documents and reports and delivered over three dozen public-facing presentations, seminars and speaking engagements that were either convened by the SSL Annex or included SSL Annex members. Overall, the purpose of including these publications and speaking events is to illustrate the focused dedication of the work of the SSL Annex to support and accelerate the global transition to energy-efficient, good quality, solid state lighting.

1. SSL Testing, Metrics and Standards

The SSL Annex works to assist the lighting metrology community and improve the comparability and accuracy of LED product testing. Over the last decade, the SSL Annex has been conducting international interlaboratory comparisons to improve measurement of SSL products globally. In 2014, the SSL Annex published a report (IC 2013 Final Report) that compared the measurement accuracy of 110 laboratories worldwide testing Light Emitting Diode (LED) lamps. That report is intended to help governments and manufacturers ensure that new LED products sold to consumers and companies are of high quality and meet the claimed performance. That work also sought to establish a common proficiency test method for accreditation programmes and some of the findings from that work contributed to the development of CIE S 025/E:2015, Test Method for LED Lamps, LED Luminaires and LED Modules, under a Communiqué between SSL Annex and CIE Division 2.

In 2021, the SSL Annex published the final report (IC 2017 Final Report) on the interlaboratory comparison of goniophotometric measurements of LED luminaires and narrow-beam LED lamps. IC 2017 was designed to be in compliance with ISO/IEC 17043 to serve as a proficiency test for SSL testing accreditation programmes that recognise this comparison. IC 2017 used CIE S 025/E:2015 as the test method for measurement of the comparison artefacts for 15 measurement quantities, and recommendations for improvement of CIE S 025 standard were provided to CIE Division 2. IC 2017 served to improve the understanding of using near-field goniophotometers and source-rotating type goniophotometers (both do not require the large laboratory space needed for mirror-type goniophotometers) and at what degree of accuracy. Building on the success of IC 2013 and IC 2017, the SSL Annex is now conducting IC 2023 for temporal light modulation (TLM) measurements. This new IC will test measurements of flicker and stroboscopic effects of LED lighting products. IC 2023 is open to all photometric labs that have capability for testing TLM quantities including short-term flicker index, PstLM, and Stroboscopic effect visibility measure, SVM, of LED lighting products.

2. Smart Lighting, Digitalisation and Connectivity

Smart lamps are an exciting new family of products which provide an opportunity for the consumer to benefit from smart services, better product quality and energy savings.

In September 2016, the SSL Annex published its first report on smart lighting products. This report provides a comprehensive overview of various features, based on measured test data from dozens of products available on the market at that time. The report offers advice to stakeholders on important issues to consider when purchasing a smart lamp in order to maximise the savings potential of these lighting products. Tests conducted on a limited number of smart wireless LED lamps used in the domestic sector reveal that these products can have substantial standby power use – which, depending on hours of use, can even be higher than the energy consumed when the light is switched on. These test results are similar to experiences with standby consumption for other products where manufacturers initially focused on new features before turning their attention to reducing the standby power consumption.

In November 2022, the SSL Annex published its second major report on smart lighting products, focusing on features that impact energy consumption. This second SSL Annex Smart Lighting report includes (a) guidance on how to test the smart lighting products, providing an update of the test procedure included in the first status report; (b) standby power analysis based on measurements performed in the period 2015-2020 including 236 smart lamps/luminaires coming from 67 different manufacturers; (c) an analysis on how dimming and colour tuning influences efficacy and luminous flux; (d) impact on standby power consumption when the product becomes more complex by addition of new features; and (e) an assessment of smart lighting market barriers including user-friendliness, interoperability, consistency, open systems, standards, and connection/co-operation with existing wired control systems.

3. Public Health, Productivity and Environmental Impacts

Starting in 2011, the SSL Annex launched a three-year study to review all of the major health-related literature associated with LED lighting. In 2014, the SSL Annex published a comprehensive review of the current literature on health-related impacts of energy-efficient LED systems in our homes, buildings and outdoor areas. The report found that SSL technology is not expected to have more direct negative impacts on human health with respect to non-visual effects than other light source technologies. Furthermore, for electromagnetic fields, human exposure emitted by SSL products does not appear to be a critical issue as their magnitude is generally much smaller than those corresponding to discharge lamps or certain household appliances. The report also provides advice on flicker and glare.

In 2018, the SSL Annex published an interim draft report that examined visual perception associated with temporal light modulation, and more specifically the stroboscopic effect. The interim report was then extended in sample size and in the scope of analysis, and underwent peer review, culminating in a final report published in March 2020. The final report provides insight into both stroboscopic visibility and the acceptability of the conditions for the full sample of 85 people and for the more sensitive individuals. The report, titled: Visual Perception under Energy-Efficient Light Sources – Detection of the Stroboscopic Effect under Low Levels of SVM, follows the publication of a peer-reviewed journal article in Lighting Research and Technology by the researchers behind the report. The SSL Annex is continuing to research health impacts of SSL and will publish a new report in late 2023 or early 2024.

The SSL Annex also examined environmental impacts of lighting, launching a research project in 2011 to review of all the available literature associated with life-cycle assessments of LED lamps and luminaires compared to conventional light sources. The final report was published in 2014 and focuses on nine life-cycle assessment (LCA) reports published between 2009 and 2013 that compare LED lamps and luminaires with conventional sources. The study found that on average, 85% of the environmental impact is linked to the use phase, while the remaining 15% is shared mainly between manufacturing and end-of-life treatment. This LCA work is being updated now, and a report is expected to be published in 2023.

4. SSL Product Quality and Performance

Starting in 2012, the SSL Annex developed and published recommendations that promote standardisation and harmonisation around key quality and performance metrics for LED products' performance globally. For the most common LED lamps and luminaires in the market, the recommendations include luminous efficacy, colour quality, power quality, lifetime and other important characteristics. These Tiers were updated in 2014 and again in 2016. The current version was published as draft in 2020 for public review/comment and then as a final version in 2022, offering quality and performance requirements that are future-oriented and account for projected performance improvements.

The new quality and performance tiers establish new quality and performance requirements for the most common types of LED lighting products including non-directional and directional lamps, integrated LED luminaires, downlights, streetlights and high and low-bay luminaires. These requirements were developed by the SSL Annex member governments' experts and underwent public review and comment. The requirements are based on extensive market research as well as on laboratory test data from participating governments. By providing these quality and performance tiers, governments and programme managers can develop programme specifications more quickly and at lower costs. The SSL Annex also hopes to bring some harmonisation to the market to avoid the situation where governments and programme managers act independently and "re-invent the wheel", a situation that can result in a patchwork of regulations or specifications around the world that is both expensive and burdensome for suppliers.

Other recent contributions by the SSL Annex include research on accelerated lifetime test methods that is now being used in the EU and elsewhere today, as well as the aforementioned subject study to help establish safe limits on temporal light modulation.

• Juries' Comments

An outstanding example of international cooperation in the development of the International Energy Agency (IEA) Implementing Agreement on Energy Efficient End-Use Equipment (4E).

Extensive work in the international arena on many aspects of SSL, not only standardization of testing but also smart lighting, health and environmental impacts and quality. Supports governments and policy makers across the world as they implement SSL QA and test facilities. Broad team of experts working together to achieve something beyond their personal research and interests.

4E SSL Annex has made great effort to promote the adaptation of LED products. It will have more impact if it actively involve more members from large developing countries.

IEA 4E SSL Annex has played an important role for LED adaptation.

Global SSL Award of Outstanding Achievement

Jury Panel

2023

Ann Webb

Professor, University of Manchester

Former President of CIE

Guoqi Zhang

Professor, Delft University of Technology

Co-Chair of ISA Board of Advisors

Istvan Barsony

Professor, Centre for Energy Research Hungarian Academy of Sciences, University of Pannonia, Hungary

Former Director of Research Institute for Technical Physics and Materials Science – MFA, Hungarian Academy of Sciences

Member of ISA Board of Advisors

Ling Wu

President of China Advanced Semiconductor Industry Innovation Alliance (CASA)

Member of ISA Council of Management

Shuji Nakamura

Laureate of 2014 Nobel Prize in Physics

Professor, Materials, University of California, Santa Barbara

Research Director of the Solid State Lighting & Energy Center

Co-Chair of ISA Board of Advisors

Warren Julian

Emeritus Professor, University of Sydney

Past President of IIluminating Engineering Society of Australia and New Zealand (IESANZ)

Member of ISA Council of Management

Yoshi Ohno

PhD., NIST Fellow, National Institute of Standards and Technology, USA

Past president of CIE

Member of ISA Board of Advisors

Chairman of ISA TCS