

1. Record Nr.	UNINA9910830642903321
Autore	Annaniah Luruthudass
Titolo	LED packaging technologies : design, manufacture, and applications // Luruthudass Annaniah, Mohamed Salleh M. Saheed, and Rajan Jose
Pubbl/distr/stampa	Weinheim, Germany : , : WILEY-VCH GmbH, , [2023] ©2023
ISBN	3-527-83167-3 3-527-83166-5 3-527-83168-1
Descrizione fisica	1 online resource (179 pages)
Disciplina	621.32
Soggetti	Light emitting diodes
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- About the Authors -- Preface -- Acknowledgments -- Chapter 1 A Brief History of Artificial Light and LED Packaging -- 1.1 Evolution in Artificial Light -- 1.2 Impact of LightEmitting Diode on the World -- 1.3 LED Industrial Chain -- 1.4 Evolution in LED Packaging Technology -- 1.4.1 LowPower Package Evolution -- 1.4.2 MidPower LED Packages -- 1.4.3 LED High Power and UltraHighPower Packages -- 1.5 Summary -- References -- Chapter 2 Fundamentals of LED Packaging Technology -- 2.1 Effective Light Extraction -- 2.1.1 Theory of Light Conversion in LED -- 2.1.2 Light Extraction Based on Chip Technology -- 2.1.2.1 Chip Surface Roughing -- 2.1.2.2 Buried MicroReflectors Chip -- 2.1.2.3 Chip Geometrical Shaping and Type -- 2.1.3 Light Extraction Based on High Reflective Packaging Material -- 2.1.3.1 Leadframe Plating Surface Influence -- 2.1.3.2 Housing Material Reflectivity -- 2.1.3.3 Encapsulation Material Light Extraction Efficacy -- 2.1.4 Optical Interface Enhancing Light Extraction -- 2.2 Package Design and Encapsulation Technology -- 2.2.1 Package Design -- 2.2.1.1 Design for Cost -- 2.2.1.2 Design for Reliability -- 2.2.1.3 Design for Manufacturing -- 2.2.1.4 Design for Testing -- 2.2.1.5 Design for Environment -- 2.2.1.6 Design for Assembly at Second Level PCB Board -- 2.2.1.7 Design for Effective Light Extraction -- 2.2.2 Encapsulation

of LED -- 2.2.2.1 Epoxy, Silicone, and Hybrid Compound Encapsulation -- 2.2.2.2 Hermetic Sealed Package - Metal Can -- 2.2.2.3 Epoxy Cap Encapsulation -- 2.2.2.4 Glass Cap on Ceramic or Aluminum Encapsulation -- 2.3 LED Thermal Management -- 2.3.1 Fundamental of the LED Thermal Behaviors -- 2.3.2 Thermal Design in LED Package -- 2.3.3 Impact of Thermal Behavior of an LED on Its Performance -- 2.4 Electrical Contact Design -- 2.5 LED Light Conversion Principle. 2.6 Summary -- References -- Chapter 3 LED Packaging Manufacturing Technology -- 3.1 LED Packaging Process Flow -- 3.1.1 DieAttach Process -- 3.1.1.1 DieAttach and Glue Curing Process -- 3.1.2 Wire Bonding Process -- 3.1.3 Surveillance Checking Using Statistical Process Control -- 3.1.4 Encapsulation Process and PostMold Curing Process -- 3.1.5 Singulation Process -- 3.1.6 Final Test and Auto Vision System Process -- 3.1.7 Packing Process -- 3.2 Common Defects in LED Packaging Industry -- 3.2.1 Diecrack: Impact on the Electrical and Optical Properties of LED -- 3.2.2 Lifted Die or Glue: Impact on LED Thermal Behavior and LED Performance -- 3.2.3 Wire Interconnect Defects: Impact on LED Electrooptical Quality -- 3.3 Summary -- References -- Chapter 4 LED Automotive Lighting Application Technology -- 4.1 Basic Science of Light for Automotive - The Photometric -- 4.1.1 Light Intensity -- 4.1.2 Luminous Flux -- 4.1.3 Illuminance -- 4.1.4 Luminance -- 4.1.5 Luminous Efficacy -- 4.2 Lighting - Light Projection "To See" -- 4.2.1 Headlamp -- 4.2.2 Adaptive FrontLighting System - Headlamp -- 4.2.3 Optical Concept Automotive Front Lighting - Headlamp -- 4.2.4 Future of LED Headlamp Technology -- 4.2.5 LED Headlamp Thermal Management -- 4.3 Signaling - Lights That Are "To Be Seen" -- 4.3.1 AFL - Day Running Light -- 4.3.2 ARL - Signaling Lights -- 4.3.3 Optic Concepts of Signaling Light "To Be Seen" -- 4.3.3.1 Reflective and Refractive Optics -- 4.3.3.2 Light Guide Optics -- 4.4 Interior Lighting -- 4.5 Summary -- References -- Chapter 5 LED Application For Consumer Industry -- 5.1 Consumer Indoor Lighting -- 5.2 Health Care and Medical Treatments -- 5.3 Safety and Security -- 5.3.1 Led in Iris Recognition System -- 5.3.2 LED in Food Processing -- 5.3.3 Treatment in Solid and Liquid Foods -- 5.3.4 Water Treatment -- References.

Chapter 6 LED Application for General Lighting -- 6.1 RETROFIT Lighting -- 6.1.1 RETROFIT Lamp -- 6.1.2 Hospitality Lighting - Architecture Lighting -- 6.2 LEDfit Lighting -- 6.2.1 Residential Lighting - Living Room Down Lighting -- 6.2.2 LED Street Lighting -- 6.2.3 Exterior Architectural Lighting -- 6.2.4 Horticulture Lighting Application -- 6.2.4.1 Photosynthesis -- 6.2.5 Photomorphogenesis -- 6.2.5.1 Impact of LED Light on Horticulture Industry -- 6.3 Summary -- References -- Chapter 7 Quantum LEDs -- 7.1 Quantum LED as the Alternative to Organic LED -- 7.2 Fundamentals of Quantum Dot -- 7.3 Quantum Dots in LED -- 7.4 Quantum LED Structures -- 7.5 QDLED Fabrication -- References -- Chapter 8 Ultraviolet LED Packaging and Application -- 8.1 UV LED Application -- 8.2 UVA and B LED Packaging Technology -- 8.3 UVC Packaging Technology -- 8.4 Future Application of UVLED and Packaging Design Evolution -- 8.4.1 Novel Liquid Packaging Structure -- 8.5 Impact of UVLED to UV Light Source Business -- 8.6 Summary -- References -- Chapter 9 Lifecycle Analysis and Circular Economy of LEDs -- 9.1 Introduction -- 9.2 LCA of LEDs -- 9.2.1 Materials Footprint -- 9.2.2 Embodied Energy and Carbon Footprint -- 9.3 Circular Economy of LEDs -- 9.3.1 Lower Material Quantities by Design and Enhanced Material Properties -- 9.3.2 Materials with Multifunctionalities -- 9.3.3 Materials of Higher Circularity -- 9.3.4

Materials with Enhanced Durability -- 9.3.5 Materials with Reduced Carbon Footprint and Embodied Energy -- 9.3.6 Material Miles -- 9.3.7 Sustainable Materials from Renewable, Recycled, and Recovered Sources -- 9.3.8 Materials with Higher Environmental Benignity -- 9.3.9 Materials with No Adverse Human Health Effects -- 9.3.10 Materials Enabling Healthy Natural Habitat -- References -- Index -- EULA.

---

Sommario/riassunto

This volume provides expert insight into current and future trends in LED packaging technologies, discussing the fundamentals of LED packaging technologies, from electrical contact design, thermal management and optical emission, and extraction, to manufacturing technologies, including the JEDEC testing standards, followed by accounts on the main applications of these LED packages in the automotive, consumer electronics, and lighting industries.

---