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Organic Light-Emitting Diodes (OLEDs), from Its History to Some
Recent Topics

By

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Abstract

The presentation deals with Organic Light-Emitting Diodes (OLEDs), from its background to some recent topics. My presentation consists of three parts. First, I will explain the basic background of OLEDs, its history, device functions, materials, and current status of manufacturing. Next, I will talk about the Color Conversion Material (CCM) type OLEDs. This method aims to simplify the OLED structures and thereby reduce the production cost using color conversion function of organic dyes. The work has been done in Fuji Electric Co., Ltd. In Japan and the author's representative work. Finally, the application of silver nanowire transparent electrodes to OLEDs will be discussed. Optical devices, including displays, solar cells, and touch panels, require thin-film transparent electrodes in order to emit/introduce light. Although Indium Tin Oxide (ITO) transparent electrodes has been conventionally used for these

devices, they suffer high production cost and usage of rear material. Transparent electrodes using silver nanowires are possible candidate for the next generation transparent electrodes with low cost and abundant of materials and their application to OLEDs is an author's current focusing work.

Biography

Masaru Nagai received his Master Degree in Polymer Science from the University of Kyoto, Japan in 1991, engaged in the theoretical and experimental study on the statistical characteristics of polymer chains in a dilute solution. He joined to the MEMC Co., Ltd., Japan to develop silicon wafer processing, including cleaning technology, degradation control, and surface analysis (1995-2000). He then moved to the TDK Co., Ltd., Japan to develop the color-filter based white OLEDs fabrication (2000-2004). He improved the production yield from 10% to 80% in 15 months, which realized the world's first mass production of full color OLEDs. He worked for Research Institute for Organic Electronics at Yamagata, Japan as a senior researcher under Prof. Junji Kido to develop OLEDs lighting (2004-2006). He then joined the Fuji Electric Co., Ltd. at Tokyo, Japan to develop Color Conversion Material (CCM) type OLEDs (2007-2013). He developed higher color-conversion-yield (>90%) and 100% color gamut CCM OLEDs. The major results were summarized in a book chapter of In-Tech press, which has been accessed more than 8000 times in the open WEB site. He received Ph.D. from the Kinki University, Japan in 2010 for the studies on OLEDs. He is now a professor of Nanjing Tech University, China (since 2013). His recent research interests are concerned with polymer solar cells, including morphology control, material characterization, and nano-material devices. Dr. Masaru Nagai published first author paper ten-plus, among which single name eight, patents 60-plus, and book chapter one. As a member of Semiconductor Equipment Material International (SEMI), established the international standard of analysis for micro contaminants on silicon wafer surfaces (1998-1999). Technical committee of International Conference on Advances in Environment Research (ICAER) 2015. Active member of Electrochemical Society (US), 應用物理學會(Japan), and 高分子學會 (Japan).

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