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Design Domain of LED-based Solid State Lighting Considering Cost, Energy Consumption and Reliability

ABSTRACT:

High power light emitting diodes (HP LEDs) are expected to become a general light source of the next generation. Unlike the conventional light sources (compact florescent light, incandescent light, etc.), the design considerations for LED-based luminaires are unique in that many design solutions are possible for the same required light output because the design parameters of passively cooled LED-based luminaires are interdependent and the corresponding requirements are dictated by operating conditions. After briefly describing the high power white LED characteristics, this seminar presents a methodology to define the optimum design domains of passively cooled LED-based luminaires for a given light output requirement, considering cost, energy consumption and reliability.



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BIOGRAPHY:

Dr. Bongtae Han is Keystone Professor of Engineering and Director of Electronic Products and Systems Division of the Mechanical Engineering Department of the University of Maryland; and is currently directing the LOMSS (Laboratory for Optomechanics and Micro/nano Semiconductor/ Photonics Systems) of CALCE (Center for Advanced Life Cycle Engineering). Dr. Han has co-authored a text book entitled "High Sensitivity Moiré: Experimental Analysis for Mechanics and Materials", Springer-Verlag (1997) and edited two books. He has published 10 book chapters and over 150 journal and conference papers in the field of microelectronics, photonics and experimental mechanics. He holds 2 US patents and 4 invention disclosures. Dr. Han received the IBM Excellence Award for Outstanding Technical Achievements in 1994. He was a recipient of the 2002 Brewer Award, presented at the Annual Conference of the SEM in Emerging Technologies. His publication awards include the Year 2004 Best Paper Award of the IEEE Transactions on Components and Packaging Technologies, and the Gold Award (best paper in the Analysis and Simulation session) at the 1st Samsung Technical Conference in 2004. His recent contributions to an innovative 1,500-face lumen LED luminaire, jointly developed with GE, have been recognized in a Press Release (Oct. 21, 2010, MarketWatch.com, The Wall Street Journal). He served as an Associate Technical Editor for Experimental Mechanics, from 1999 to 2001, and has been serving as an Associate Technical Editor for Journal of Electronic Packaging, Transaction of the ASME since 2003. He was elected a Fellow of the SEM (Society for Experimental Mechanics) and the ASME (American Society for Mechanical Engineers) in 2006 and 2007, respectively.