A white–cyan-red LED system for low correlated colour temperature lighting - DTU Orbit (17/02/2019)

A white–cyan-red LED system for low correlated colour temperature lighting

A white LED complemented by cyan and red LEDs is a good candidate for achieving high colour rendering at low correlated colour temperatures. This is usually very difficult with commercially available white LEDs. In addition, the system is able to replace incandescent lighting in many applications; for example, the lighting for museum display cases. To investigate and optimize the colour and light distribution properties, both spectral and geometrical modelling are used. Mapping of the possible combinations of LEDs is used to locate the optimal solutions within the colour gamut, with emphasis on chromaticity and colour rendering indices. A geometric optical model is used to design and optimize the homogeneity of the colour and light intensity distribution as a function of angle. The resulting system produces diffused homogeneous white light with a tunable correlated colour temperature from 2000 K to 2400 K. Within this range the white light is characterized by a high general colour rendering index (Ra>90), special colour rendering indices for saturated red objects (R9>85), and low chromaticity distance (Duv) from the Planckian locus (Duv<2×10^-3).

General information
State: Published
Organisations: Department of Photonics Engineering, Diode Lasers and LED Systems
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Number of pages: 14
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Lighting Research and Technology
ISSN (Print): 1477-1535
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.24 SJR 0.66 SNIP 1.157
Web of Science (2017): Impact factor 1.921
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.05 SJR 0.533 SNIP 1.495
Web of Science (2016): Impact factor 1.784
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.42 SJR 0.821 SNIP 1.555
Web of Science (2015): Impact factor 1.667
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.19 SJR 0.856 SNIP 1.83
Web of Science (2014): Impact factor 1.691
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 1.48 SJR 0.938 SNIP 1.599
Web of Science (2013): Impact factor 1.485
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.96 SJR 0.793 SNIP 1.786
Web of Science (2012): Impact factor 1.197
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 0.83 SJR 0.583 SNIP 1.482
Web of Science (2011): Impact factor 1.551
ISI indexed (2011): ISI indexed yes