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Phosphor solutions for the reduction of the time dependant intensity variation of AC LEDs

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AC driven LEDs show very high wall plug efficiency combined with a good colour rendering and long-term stability. For general lighting, LEDs have surpassed the traditional incandescent and fluorescent lamps years ago. (1) However, LEDs still have a tremendous drawback, which is known as flicker. Perceived flicker is caused by the time dependant variation of the luminous intensity of a light source. The consequences for humans under such illumination situations expand from headaches to neurological problems, even including epileptic seizure (2). Since many research activities in this field are conducted to solve or to reduce problems accompanied by flicker, we came up with a possible solution to it. Since the zero point of an AC current cannot be turned out completely, the solution must be based on the used conversion layer (mostly a phosphor particle or ceramic layer) or a combination of a driver systems and the used converter in order to smoothen the Flicker to 100%. In this work a couple of standard LED phosphors have been tested, such as $Y_3Al_5O_{12}:Ce^{3+}$, $BaMgAl_{10}O_{17}:Eu^{2+}Mn^{2+}$, $CaAlSiN_3:Eu^{2+}$, $Ca_3Sc_2Si_3O_{12}:Ce^{3+}Mn^{2+}$ and $Sr_2P_2O_7:Eu^{2+}Mn^{2+}$ with respect to flicker reduction. It will be demonstrated why $Y_3Al_5O_{12}:Ce^{3+}$ won't lead to a solution for this problem and possible solutions will be discussed. The capability of other phosphors to reduce flicker will be shown. From these findings requirements for the development of novel phosphors to reduce the flicker problem will be drawn. A prediction will be given concerning the future potential of this technique and achievments so far will be presented.

Biography

Simon Korte has gained his bachelor degree in chemical engineering and his master degree, specialising on material science, at the University of Applied Science MUnster. Subsequently he started his PhD studies at the University of Applied Science MUnster and does his research on "luminescent materials for flicker reduction of AC-LEDs" in the working group of Prof. Thomas JUstel.

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