

Pulse-excitation of photoluminescent phosphors used with high-power blue and near-UV light-emitting diodes for general lighting

IREC Lighting Group

Luminescent Materials Thrust Area

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Based on the persistence of the photoluminescence (PL) phosphors used for energy conversion on high-power white light-emitting diodes (LEDs), for application on general lighting, the focus of this research is to study and to evaluate the possible optimization on performance of different phosphors by pulsing its excitation light (blue or near-UV). The first stage of this research consists on the measurement of the persistence (decay) time of some commercially available high-power “remote-phosphor” LED modules. By knowing the decay time and choosing an appropriated frequency and duty cycle to drive the pump light, it is expected to improve the phosphor performance and likely also to obtain higher total efficiencies of LED modules. In the second stage of this project is scheduled to characterize other phosphors different than the commercially available ones and to evaluate the effect on the total package efficiency due to driving by pulses the high-power phosphor-based LED packages.

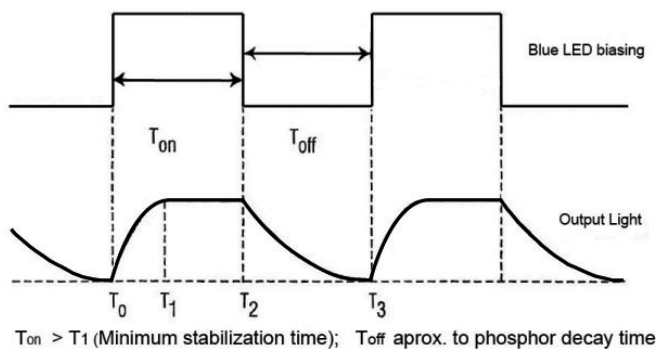


Figure 1: Expected response of the phosphor’s emitted light for a LED driven with a T_{on} greater than T_1 (minimum time to establish maximum phosphor output light) and T_{off} near to the phosphors decay time.

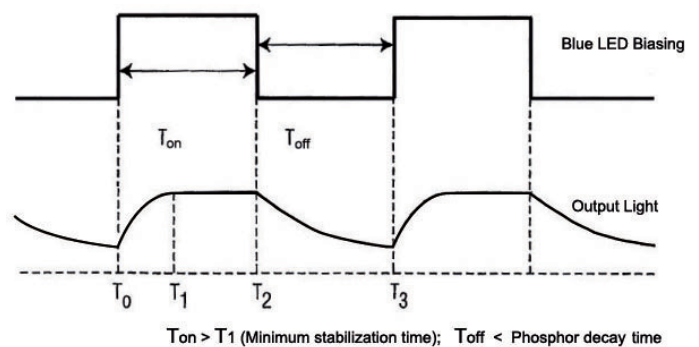


Figure 2: Expected response of the phosphor’s emitted light for a LED driven with a T_{on} greater than T_1 (minimum time to establish maximum phosphor output light) and T_{off} less than the phosphors decay time.

Objective:

Characterizing and optimization of phosphors used in LED package/modules for general lighting.

Application:

LED package/modules for general lighting

Highlights/Innovative Features:

Characterization and optimization of phosphors used in LED packages/modules for general lighting.

Projects Dates:

July 2010 to July 2012

Sponsor:

IREC internal