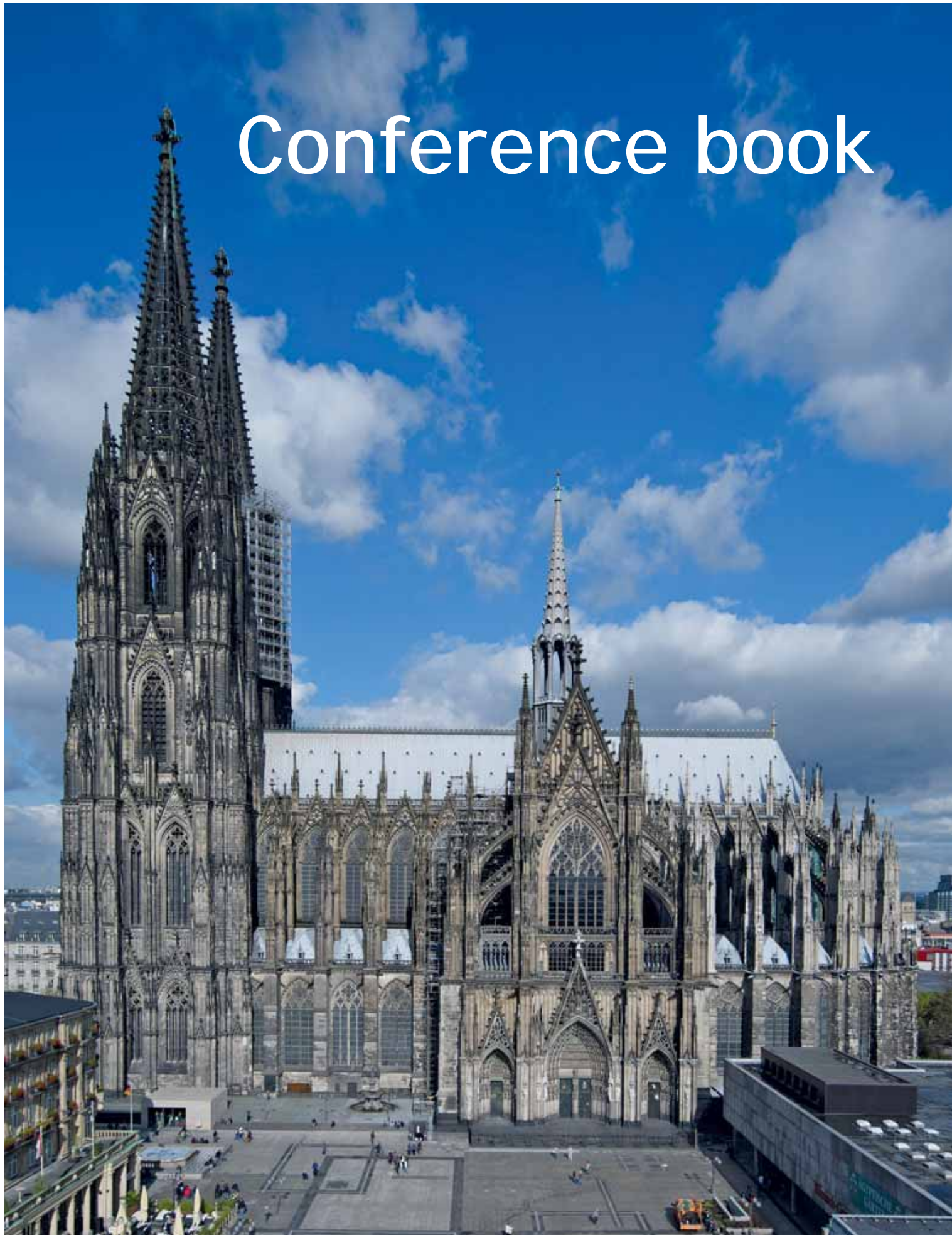


Conference book



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Electroluminescence and Organic Optoelectronics
August 31 - September 3, 2014 | Cologne, Germany

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Session 2.4

Novel Devices, Hybrid Devices, and OFETs

Tuesday, September 2, 2014

6:30 p.m. – 9:00 p.m.

P-2.410 | Stability improvement of PMMA and Lumogen® coatings for hybrid white LEDs

Fulvio Caruso¹, Mauro Mosca¹, Salvatore Rinella¹, Roberto Macaluso¹, Claudio Cali¹, Filippo Saiano², Eric Feltin³

¹University of Palermo, Department of Energy, Information engineering and Mathematical models, Italy; ²University of Palermo, Department of Agricultural and Forest Sciences, Italy; ³Novagan Sàrl, Lausanne, Switzerland

Hybrid white LEDs employing perylene-based dyes for the frequency down-conversion of blue light, generated by a standard inorganic source, suffer from colour rendering variations due to the degradation of the organic molecule under prolonged irradiation [1, 2]. To avoid such inconvenient, proper encapsulation of the dyes in resins or other polymer matrices can prevent their accelerated ageing [3]; nevertheless, embedding polymers can also exhibit significant bleaching caused by chemico-physical agents. Among all, polymethyl methacrylate (PMMA) is one of the most used materials for the fabrication of hybrid LEDs' colour conversion coatings, therefore its stability needs to be investigated.

In this work we report on the thermal- and photo-stability of a white LED device obtained with the deposition of a solution, containing Yellow Lumogen® and PMMA, by spin-coating on the sapphire's bare side of a GaN/InGaN low-power blue LED wafer. Under normal operation conditions (20 mA of constant driving current for over 3 hours), a noticeable variation in the spectral emission corresponding to the blue peak (~450 nm) is recorded while the luminescence of the dye remains unchanged; the resulting colour shift is visible and have also been reported as a variation of the light source's coordinates in the CIE chromatic space. Possible alterations in the properties of the PMMA-based coating have been studied.

Experimental results have proven that the device temperature remains under control and never exceeds 30 °C on the unprocessed side of the wafer, thus thermal degradation phenomena of the polymer have been excluded. Several tests run by irradiating thin film samples of PMMA with low- and high-power blue LEDs have confirmed that the photo-stability of polymethyl methacrylate is compromised. FT-IR spectroscopic analysis of the polymer reflected a variation in the carboxyl bond. A curing process of the samples consisting of a 1 hour constant exposure to an UV source has been carried out, then the samples have been again irradiated with the blue sources; after the process, spectral observation has confirmed the stabilisation of the optical performances of the coating. Finally, a blue LED spin-coated with cured PMMA mixed with the Lumogen® dye has been operated for over 3 hours and showed no shift in the emitting colour.

References

- [1] Caruso, F. *et al.*, "Generation of white LED light by frequency down-conversion using a perylene-based dye", *Electronics Letters*, vol. 48, n. 22, 2012, 1417-1419.
- [2] Sessolo, M. and Bolink, H. J., "Hybrid Organic-Inorganic Light-Emitting Diodes", *Advanced Materials*, vol. 23, 2011, 1829-1845.
- [3] Schubert, E. F., "Light-Emitting Diodes", Cambridge University Press, Cambridge, 2006, 350-351.

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