The Preparation with Argon Milling and Characterization with Cathodoluminescence of HB LED's

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ABSTRACT

High Brightness LED's (HB LED's) are emerging as a viable lighting alternative for industrial, commercial as well as home use. The competitive advantage of HB LED's over alternative light sources are; their low power consumption and longer life-times. These market advantages must be balanced by their high production costs resulting in a much higher selling price. This high price mandates finding failure modes and increasing the reliability and lifetime of these devices for them to succeed in the market.

A key factor affecting the lifetimes of HB LED's is heat induced degradation of the LED at one of the many interfaces in a completed device. These interfaces occur between materials with widely different thermal, electrical and hardness characteristics. Therefore, making cross sections while preserving the interfacial structure is extremely difficult using either FIB, cleaving or mechanical polishing. An alternative method will be demonstrated using a collimated Argon beam with a shielding blade to produce an undamaged interface suitable for high resolution SEM imaging and analytical characterization. This paper will describe results using this Argon Beam cross sectioning technique along with Cathodoluminescence to characterize the LED layer structure as well as the phosphor for commercially produced HB LED's.

KEY WORDS: Argon Milling, Cathodoluminescence, HB LED's

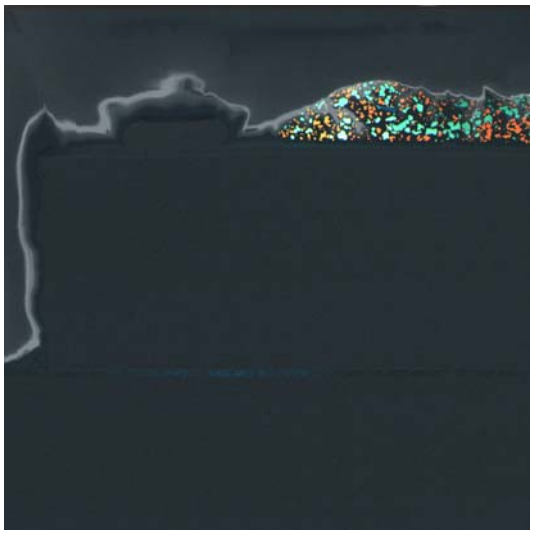

FIGURE 1. Cathodoluminescence from a Commercial HB LED Device