

SLM Technology:

Total Power Opens the Door to the Digital Inkjet Market for Phoseon

Michael Beck, North American Sales Manager, Phoseon Technology

A growing number of commercially available digital inkjet systems have successfully incorporated UV-LED light sources. At the low-end of the system price scale are single-pass TIJ-based printing systems that are typically designed for addressing, label, or variable/barcode printing.

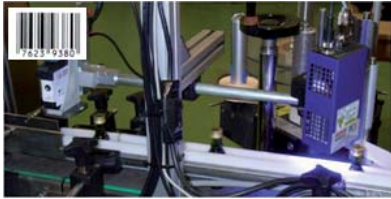


Figure 1: Single-pass Printing

At the high-end are wide format printers creating posters, billboards, or fleet displays with top quality colors as highlighted by the recent announcement by Agfa of the integration of the UV LED based RX FireLine in the :Anapurna 2500 LED product.



Figure 2: Wide Format Printing

The increase in total power and peak irradiance achieved by the Phoseon UV-LED lamps has resulted in a rapid increase in the adoption of these light sources into a variety of inkjet printing applications. The increase in total UV power delivered has made cure rates competitive or superior to existing mercury lamp systems while maintaining or increasing print quality while eliminating many of the inherent issues related to traditional mercury lamps. The total power output capability of the Phoseon UV-LED lamps has dramatically increased during the past five years. See figure 3 for Phoseon UV-LED output data.

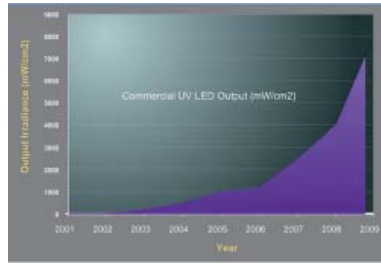


Figure 3: Output Irradiance Over Time

UV LED sources are typically specified in terms of their output power - either total UV output (W) or peak irradiance-energy density (W/cm^2). Recent technological advances have resulted in UV-LED based light sources that can generate peak irradiances combined with total UV power similar to the output of a mercury lamp rated at 600W/in input power.

Peak irradiance is an important metric since intensity is required to initiate the polymerization of the ink. Higher peak irradiance results in a more aggressive polymerization mechanism which is important in obtaining full cure, helping to overcome oxygen inhibition at the surface, and achieving the required cure rate. However, peak irradiance is only one variable, and in many cases not the most important one.

Recent research has indicated that peak irradiance combined with total power delivered is more important than a precise wavelength match on inks developed to cure in the UV-A region. The summary finding is that, "The peak intensity and total energy of a UV LED source in the UV-A region is relatively more important for cure performance than the specific peak wavelength of the UV LED source in the UV-A region (365nm vs. 395nm). In the end energy trumps wavelength in terms of the reaction - at least when the wavelength ranges are relatively close together in the spectrum." Fourier

Transform IR (FTIR) data published at [RadTech Europe 2009](#) and can be found on the [Phoseon website](#).



Figure 4: UV LED 395nm UV Source at Different Peak Intensities Curing Black Ink

Advantages of SLM Technology

- The full-intensity lifetime is expected to be 15,000+ hours compared to less than 2,000 hours with traditional lamps.
- Power consumption is approximately 50% less than that of equivalently-intense lamps.
- SLM arrays are instant on/off, increasing throughput of SLM-based equipment compared to lamp-based equipment.
- SLM arrays can be constructed to irradiate a wider area more uniformly than lamps, enabling new applications such as web curing of photopolymers.
- SLM technology allows for the best cost per watt.

The Future of UV-LED Lamps

UV-LEDs will continue to gain acceptance as the output increases and the initial investment costs decrease. Over the past 2 years, the price per watt of UV-LED energy has decreased dramatically. As more ink/chemistry suppliers are pushed by their customers to develop UV-LED optimized materials, additional applications will adopt this technology.