

'More power to the people' with a 60W Intracavity UV ns Laser

J. Kilmer¹, A. Burzo¹ & Y. Yin¹

1- Photonics Industries, 1800 Ocean Avenue, Ronkonkoma, NY 11779

Author e-mail address: jkilmer@photonix.com

Owing to key patented [1,2] technologies where THG crystals with no indexing are used, Photonics Industries (PI) intracavity (IC) harmonic generation provides the highest pulse energy on the market >1mJ pulse energy (3x to the next closest competitor) up to 40kHz, the highest intracavity (up to 60W) UV (at 355nm) output, <1% p-p stability, M2<1.1, single shot to 300 kHz PRF, Additional features include total pulse control, field replaceable pumping diode all embodied in the lightest weight/smallest footprint, most compact All-in-One (i.e., eliminating the driver and umbilical) industry grade single box design with the lowest power consumption and the lowest cost of operation (COO) on the market.

There are several important benefits for using IC harmonic generation, among which is the efficiency of the conversion versus the external cavity (EC) harmonic generation. For EC, the pulse-to-pulse stability degrades, while IC preserves this parameter very well. IC delivers superior average power stability which is relatively insensitive to ambient temperature changes. The ambient temperature sensitivity in external cavity lasers also leads to large beam pointing drift which is a function of temperature ($\mu\text{rad}/^\circ\text{C}$). Developing process applications of lasers that exhibit a large drift in the beam pointing become a very challenging task. However, PI's DSH Series lasers' beam pointing is independent of temp.

The ablation threshold for most materials is lower for UV than for IR radiation. This is because the UV process is primarily photochemical ablation while, for IR, it is primarily photothermal which leads to a greater Heat Affected Zone (HAZ) than at shorter wavelengths. Better processing quality, in addition to better depth control is achieved at shorter wavelengths. While a smaller wavelength dependence is observed with metals, insulators are more wavelength dependent where shorter wavelengths are preferable. For example, polymers and glasses can benefit from these shorter wavelengths [3].

[1] Yusong Yin, "Third harmonic generation apparatus", US Patent 5,898,717.

[2] Y Yin & D Donskoy, "Third harmonic generation apparatus", US Patent 5,936,983.

[3] J. Kilmer, M. Terraciano and Y. Yin, "Sub-ns and ps Laser Performance and Results," SPIE Photonics West Conf, Proceedings Volume 8607: Laser Applications in Microelectronic and Optoelectronic Manufacturing (LAMOM) XVIII, (2013).