

Nanosecond UV Imaging Systems Maintain Superiority in Demanding Applications

Jeffrey Sercel¹, Dana Sercel¹, Joshua Stearns¹

1-JP Sercel, TBC, LLC. PO Box 1621 Center Harbor, NH 03226

Jstearns@sercelmicro.com

UV excimer lasers dominated the advanced micromachining market for decades. Despite strong challenges from DPSS, fiber, and ultrashort lasers, nanosecond UV gas lasers have cemented a presence as the only solution for many applications. Imaging systems make ideal use of the large, uniform beam the excimer outputs- allowing sub-micron repeatability and flexibility in shaping laser light delivery to target. Mini excimers have overtaken their large predecessors for many applications as a cost-effective and low maintenance tool.

This presentation demonstrates areas where the excimer, especially at a wavelength of 193 nm, retains superiority. Ideal applications discussed include large area, low energy density scanning applications, such as laser lift-off (LLO) and annealing, where <3% beam uniformity may be required over a 500 x 500-micron area, or medium to high energy density micromachining of features < 2- 150 microns wide. Examples of micromachined features as well as processing strengths and limitations are demonstrated for key materials including many sensitive and transparent materials such as glass, diamond, MgO, and polymers.

Imaging system design is critical to make the best use of the excimer beam. Mask geometry can be used to differentially expose material and create complex 3D contoured geometries. Examples of contours and possibilities for masks in motion will be discussed.