

RESEARCH ON ULTRASONIC VIBRATION AIDED FEMTOSECOND LASER MACHINING PROCESS OF TRANSPARENT MATERIALS

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ABSTRACT

A new process of femtosecond laser micromachining with ultrasonic vibration aided device is proposed. An ultrasonic aided device has been designed, and the laser micromachining experiments of transparent materials have been carried out. The effects of the ultrasonic vibration with different power on surface quality and the drilling depth were investigated, and the mechanism of the ultrasonic vibration aided laser machining analyzed. After introducing the ultrasonic vibration device, the residue debris on surface of the ablated trench is significantly reduced, and the drilling depth is increased. These results show that, ultrasonic vibration can effectively improve the surface quality of material processing, increase the depth of the drilling hole and promote the processing efficiency of the femtosecond laser.

Keywords: *Femtosecond Laser Micromachining, Ultrasonic Vibration, Surface Quality*