

ABSTRACT

METHOD AND APPARATUS FOR NON-ABLATIVE, PHOTOACOUSTIC COMPRESSION MACHINING IN TRANSPARENT MATERIALS USING FILAMENTATION BY BURST ULTRAFAST LASER PULSES

An apparatus, system and method for the processing of orifices in materials by laser filamentation that utilizes an optical configuration that focuses the incident laser light beam in a distributed manner along the longitudinal beam axis. This distributed focusing method

5 enables the formation of filaments over distances, and the laser and focusing parameters are adjusted to determine the filament propagation and termination points so as to develop a single/double end stopped orifice, or a through orifice. Selected transparent substrates from a stacked or nested configuration may have orifices formed therein/therethrough without affecting the adjacent substrate. These distributed focusing methods support the formation

10 filaments with lengths well beyond ten millimeters in borosilicate glass and similar brittle materials and semiconductors.

Fig. 6