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Propagation in atmosphere of ablated material from femtosecond laser machining of fused silica TREVOR BOWMAN, BRIAN CANFIELD, LLOYD DAVIS, UTSI — Femtosecond laser pulses provide a means to machine structures with small heat-affected areas through highly non-linear mechanisms that enable direct writing of nanoscale features, which can be applied for fabricating a range of devices, including micro-optics and micro-fluidics. A single, tightly focused ultrashort pulse induces extreme conditions on sub-picosecond time-scales and forms a region of expanding plasma beyond the focal region. This plasma, which typically limits the depth of the nanoscale features to create shallow craters, results in the ejection of micro/nano-particles. The generation and use of these particles have a large range of applications in nanotechnology. We have studied the propagation, in atmosphere, of micro/nano particles ejected using single pulses from a 100 fs, 800 nm laser tightly focused with either a line or spot profile near the back surface of a fused silica substrate. The substrate was translated such that a fresh portion was ablated with each pulse. Time-gated images of the ejected material were taken using an intensified charged coupled device camera with additional illumination along the axial direction. Physical mechanisms and experimental results to date will be discussed.

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