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Sommario/riassunto	<p>Ultrashort laser sources with pulse durations in the sub-picosecond regime enable a new domain of precision machining of various materials. Pulse durations shorter than the electron-phonon coupling time lead to minimum thermal load or even non-thermal ablation processes. Exploiting non-linear absorption processes, the absorption becomes nearly material independent when laser pulses of several micro joule energy and high beam quality are focused on the materials surface. Very small pulse energies and high intensities well above the vaporization threshold enable high-precision cutting, ablation and drilling of even weakly absorbing materials, multi-component and multi-layer systems. Additionally, focusing ultrafast laser pulses in the volume of transparent dielectrics allows localized modification of the bulk material. Specifically, defined refractive index changes in glasses and crystals can be utilized for wave guiding and beam forming applications. In addition, a combined approach of material modification followed by chemical etching provides the possibility to manufacture micro-channels or 3D-micro mechanical parts. The 3D-capability of the in-volume materials processing by selective laser etching "ISLE" originates from the non-linear absorption of light in the initially transparent material.</p>