

Broadening the spectrum of precision femtosecond laser processing

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We compare the surface modification response of various bandgap materials to femtosecond laser pulses at non-conventional driving wavelengths, from UV to MIR. The wavelength dependence of the fluence ablation threshold and machining performances are discussed, making special emphasis on industrially-relevant aspects as machining resolution and repeatability. Firstly, we demonstrate that resolution is not dependent of the nonlinear nature of light absorption, leading to modification features that are perfect imprints of the beam profiles in all cases. Secondly, we present a simple and general model for aprioristic evaluation of machining repeatability and access reproducible features as small as 1/10 of the beam size with a very stable 200-fs laser source.