Highly efficient and precise processing inside transparent materials

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Processing using femtosecond laser Inside transparent materials

Refractive index distribution can be created inside various transparent materials with a spatial resolution of less than micrometer by focusing femtosecond laser pulses.

Optical waveguides, 3D optical data storage, space selective light emission, coloration and ion migration inside glasses.

Highly efficient laser processing with an LCOS-SLM

Multiple light spots can be generated by modulating the phase distribution of a laser pulse.

Application

3D structure  Micro optics  3D splitter waveguides

Ultrafast microscopic photograph of laser processing inside various transparent materials

Inside a glass

-100 ps  0 ps  1 ps

Material deformation process after irradiation with a focused laser pulse can be observed with a time resolution of 10^{-13} second. With this technique, we can elucidate the origin of damage after loading external force to various solid materials.

Inside a MgO crystal

-100 ps  0 ps  1 ps

Material deformation process after irradiation with a focused laser pulse can be observed with a time resolution of 10^{-13} second. With this technique, we can elucidate the origin of damage after loading external force to various solid materials.

Nanostructuring inside a glass  - Nanograting

Rewritable 5D (= X + Y + Z + E + G) optical storage with a capacity of 37 GB/cm^3 corresponding to about 10 times larger than that of Blue-ray disc.

Refractive index change

Phase retardation (ε)

-100 ps  0 ps  1 ps

Material deformation process after irradiation with a focused laser pulse can be observed with a time resolution of 10^{-13} second. With this technique, we can elucidate the origin of damage after loading external force to various solid materials.

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