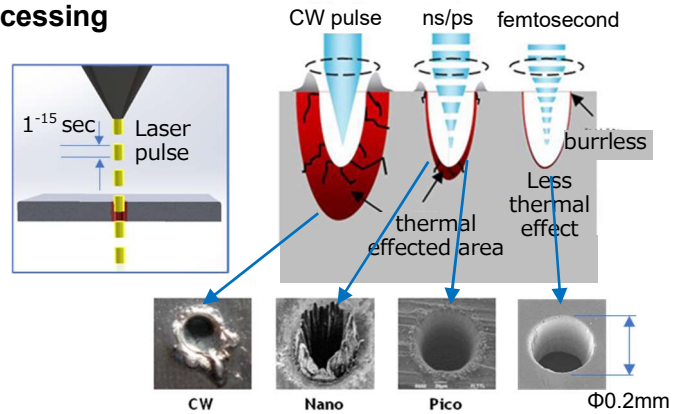


## Principle and Application of Femtosecond Laser Processing

### 1. The principle of femtosecond laser processing

Why are femtosecond laser machines capable of extremely precise processing with a clean-cut surface finish? The reason is that this laser machine irradiates a minute area on a material with high energy laser pulse for a few femtoseconds (a few quadrillionths of a second) which can instantaneously evaporate the material in the area, resulting in fine and clean-cut surface without thermal impact to the material.



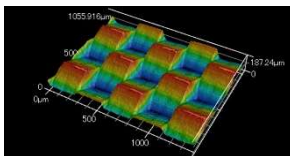
### 2. Specification of our femtosecond laser machine

Max. output: 20 W (at the wavelength of 1030 nm, fundamental wave)  
 10 W (at the wavelength of 515 nm, 2<sup>nd</sup> harmonic)  
 5 W (at the wavelength of 343 nm, 3<sup>rd</sup> harmonic)  
 Processing axes: in X and Y (for the suction stage)  
 in Z (for the laser irradiation unit)  
 vertical angle (moved by the rotating chuck)  
 Work size: a pipe workpiece with  $\Phi 0.5 - 4$  mm  
 a block workpiece with L 200 × D 100 mm at maximum  
 Minimum processable size: groove width of 10  $\mu$ m  
 hole with  $\Phi 10$   $\mu$ m with 5° in cone angle

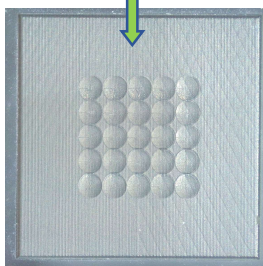
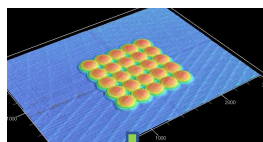


### 3. Processed examples

1. Examples of fine drilling, cutting, and pattern making on a metal, resin, and ceramic.



Silicon wafer □1.4 mm

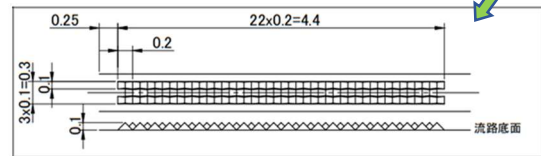
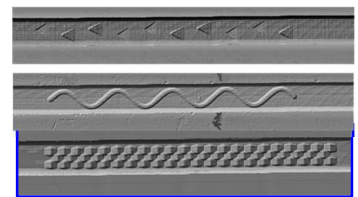
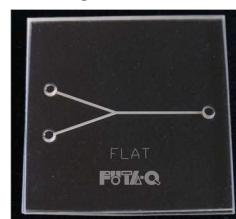


SUS sheet □2 mm



Sapphire glass t 0.8 mm

2. An example for making microchannels on a glass or transparent resin plate.



Please refer to our Technical Information vol.14, "Femtosecond Laser for Microprocessing", for more information.

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