

Microtexturing of materials by nano- and femtosecond laser pulses

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In recent years, laser processing of materials has been actively used to change their physical and chemical properties. Nanosecond and femtosecond pulses are most often used. Nanosecond lasers are characterized by thermal effects on materials. The main applications of nanosecond lasers include micro-processing, medical procedures such as laser surgery and skin treatment, and chip manufacturing in the semiconductor industry. Their advantages are high pulse energy and relatively low cost of equipment, but significant thermal effects remain the main disadvantage. Femtosecond lasers minimize the thermal effect on the material, which localizes its heating and ensures more accurate and clean processing. This makes them ideal for precision micro-machining, including high-precision cutting and drilling, as well as for microelectromechanical systems (MEMS). Femtosecond lasers are also widely used in medical applications such as laser vision correction (LASIK) and microsurgery.

This work presents the results of processing materials with nanosecond and picosecond laser pulses. As a result of exposure to nanosecond pulses, it was possible to achieve a developed morphology of the surface and its composition contributing to the achievement of superhydrophilic wetting properties. Femtosecond radiation has been used to create microchannels in transparent materials.

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