Antibacterial effect of periodic structure formed on stainless steel by using femtosecond pulsed laser

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The microstructure of solid surfaces is known to significantly impact functionality. For instance, in addition to controlling wetting properties[1], friction[2], and optical characteristics[3], it has been reported that new functionalities, such as antibacterial properties[4-5] can be imparted to materials. Microstructure formation techniques commonly used lithography and imprint methods. However, these methods suffer from challenges related to the use of environmentally impactful chemicals, the complexity of processes and equipment. Based on reports that pulse lasers can create fine structures on solid surfaces[5][6] at the scale of laser wavelengths by irradiating them, we focused on microstructure formation through laser processing

We investigated the laser induced periodic surface structures (LIPSS) formed on a stainless steel (SUS430) with a femtosecond pulsed laser (pulse width 150 fs, wavelength of 515 nm, repetition rate of 0.5–5 kHz, and laser fluence of 0.1–0.3 J/cm^2) and we investigated the relationship between the LIPSS and the bacterial effect of the surface and compared LIPSS formed by nanosecond pulsed laser.

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