SOLAR PRO.

Storage pulse surface strengthening

Electropulsing (EP)-assisted laser shock peening (LSP), involving the synchronous application of EP and LSP to Ti-6Al-4V samples, represents an innovative ...

Polymeric-based dielectric materials hold great potential as energy storage media in electrostatic capacitors. However, the inferior thermal resistance of polymers leads to ...

metallic surface peening using femtosecond laser pulses to improve the surface hardness, corrosion resistance and fatigue properties [16-18], the underlying peening mechanism at atomic view is still elusive. In this work, we studied the femtosecond laser peening (FLP) on stainless steel surface without sacrificial overlay and confinement ...

Advanced surface engineering technology will lay the technical foundation for the advanced design and manufacturing of modern machinery and solve the bottlenecks of sophisticated equipment such as reliability and life [40]. In recent years, research on various carbide surface-strengthening technologies has gradually increased. We used the ...

Here we have introduced the nondestructive laser peening using femtosecond lasers with ultrahigh pulse density and ultralow pulse energy by a combined approach of experiment, finite element analysis, and molecular dynamics simulations, taken stainless steel as a paradigm. A reinforcement of 33.6 % was achieved on surface hardness of American National Standards ...

Regular dents are produced at the material surface with relatively low pulse energies, and the regular dent morphology disappears gradually with increasing pulse energy, suggesting an increased ...

Compared to traditional surface strengthening techniques, LSP provides the advantages of high machining precision and flexibility, achieving surface strengthening with minimal surface damage. This study conducted a series of LSP experiments on the additively manufactured Cu Sn alloy with varying single pulse energy, which achieving defects healing ...

2. Research Progress on the Enhancement of HSS"s Surface Characteristics by High-Energy Beam Remelting. Typically, the principle of using a laser as a heat source for remelting and strengthening HSS is to use laser scanning to heat the surface of the material, which triggers the surface of the substrate to melt and then rely on the self-excited cooling of the substrate ...

SOLAR PRO. Storage pulse surface strengthening

Polymer dielectrics for high-temperature capacitive energy storage suffer from low energy density and poor efficiency, which is mainly attributed to the exponential growth of conduction loss at high electric fields. Here, a surface strengthening strategy to inhibit the ...

Surface topography of (f) pristine ANSI 304 stainless steel, steel surface processed by FLP (g, h, i) with pulse energy of 0.25 uJ (fluence of 0.3 J cm -2) and laser energy density of 0.5, 1, 1.5 × 10 4 J cm -2, respectively. (Sa: arithmetic mean deviation of surface roughness; Sq: root mean square deviation of surface roughness; Sz: maximum height of profile.)

1 Surface Strengthening of Stainless Steels by Nondestructive Laser Peening Pengjie Wang1, Qiang Cao1, *, Sheng Liu1 and Qing Peng 2,3 1The Institute of Technological Sciences, Wuhan University ...

Despite increased surface roughness, the synergistic action of compressive residual stress, work hardening, and heterogeneous near-surface microstructure prolongs the ...

A reinforcement of 33.6 % was achieved on surface hardness of American National Standards Institute (ANSI) 301 stainless steel with the pulse energy of 0.375 uJ (fluence of 0.45 J cm?²) and ...

Disordered polarization and distribution, chemical inhomogeneity, and insulating boundary layers are achieved to provide the fundamental structural origin of the relaxation ...

Li et al. [44,45] strengthened the surface of M2 HSS with a plasma beam, and the hardness of M2 HSS increased by approximately 150 HV in the near-surface layer of approximately 250 um under the working condition treatment of an acceleration voltage of 200 kV, beam density of 180 A/cm 2, the pulse width of 150 us, and a number of pulses of 10 times.

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