

Shot peening surface treatment effect in 316L stainless steel surface modification

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Stainless steel 316L (low carbon) is the most widely used steel as biomaterial. This metal has low toughness, so metallic implants are prone to wear [1]. Residual compressive stress and surface toughness increase can improve materials life fatigue, as a tough layer prevents plastic deformation. Materials failure, as fatigue and wear, are related to materials surface properties and structure [1]. Shot peening is a mechanical surface treatment in which many small spheres are accelerated and blasted in materials surface to promote impacts with sufficient energy to generate plastic deformation. The main aim of this technique is to induce residual compressive stress on materials surface, increasing wear properties and toughness. Surgical implants are submitted to this treatment to generate surface roughness increase for better adhesion too [2]. In this work, shot peening was performed using four different conditions to verify the effect on surface modification. Microscope techniques, x-ray diffraction, residual stress, toughness and roughness measurements were used to validate the tests. In conclusion, shot peening is an effective surface treatment to induce residual stress and increase roughness and toughness in 316L stainless steel.

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References:

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