

Nitriding of 40h13 steel in inductively coupled plasma: role of a bias potential

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Received March 05, 2022

This article describes the influence of a bias potential on structural and functional properties of austenitic steel 40h13 after radio-frequency nitriding using an inductively coupled plasma of a mixture of argon, hydrogen and nitrogen. The three-layer structure is formed in a surface layer of the steel, its crystal structure depends on the bias potential. The thickness of the nitrided layer and surface roughness non-linearly depend on the bias potential due to changing an intensity of surface sputtering by plasma ions. Wear resistance and corrosion resistance of 40h13 steel in 3.5 wt. % NaCl solution are increased from 5.0×10^{-4} to 4.8×10^{-7} mm²/(m N) and from 1.6×10^{-9} to 1.7×10^{-10} A/cm² as the bias potential changes up to -80 V, respectively. The obtained results can be used to modify a duplex technology for material processing.

Keywords: radio-frequency (RF) ion-plasma nitriding, inductively coupled plasma, bias potential, microhardness, steel 40h13.

DOI: 10.51368/1996-0948-2022-2-16-23

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