

ELION NITRIDING OF AISI 1020 AND AISI 5140 STRUCTURAL STEELS*

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Nitriding of steels AISI 1020 and AISI 5140 was carried out under conditions of exposure of samples to both the ion and electron components of the gas discharge plasma, realizing the “elion” process [1]. This made it possible to control the temperature of the nitriding process without changing the current density of the incident ions and their energy. A nitriding regime has been revealed that makes it possible to form a hardened layer up to 500 and 240 μm thick, respectively. It is shown that the microhardness of the surface layer of steel increases with an increase in the nitriding temperature. It was found that in the nitriding temperature range from 450 to 600°C, the maximum value of microhardness for both steels is fixed at a temperature of 520°C in the near-surface layer at a depth of $\approx 10 \mu\text{m}$. It has been established that the wear resistance of steel is determined by the concentration of nitrogen atoms in the α -Fe crystal lattice. It is shown that the studied steels are subject to different morphological transformations during nitriding under the same conditions.

REFERENCES

- [1] Lopatin, I.V., Akhmadeev, Yu.H., Kovalsky, S.S., Ignatov, D.Yu. Arc discharges operation in elion mode // Journal of Physics: Conference Series, 2064(1), 012029, 2021.

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