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Impact of thermochemical treatment on structure and phase state of austenitic alloy(Conference Paper)

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Просмотр дополнительных организаций

Краткое описание Просмотр пристатейных ссылок (9)

The paper presents the transmission electron microscope (TEM) investigations of the structure and phase composition of 0.4C-1Cr-1Ni-1Al austenite steel alloy before and after electrolytic plasma treatment or carbonitriding. Electrolytic plasma treatment is performed in an aqueous solution at 700° for 5 min. The phase composition of the alloy, its size, volume fraction and localization are determined for carbide and carbonitride phases. The type of the dislocation substructures is determined for each phase composition, and the scalar dislocation density is measured. It is shown that before the electrolytic plasma treatment, the alloy matrix is Al0.7Cr0.3Ni3 FCC phase which represents grains with different size. There are fine grains along the boundaries together with coarse grains. Experiments show that particles of other phases are observed inside coarse grains of Al0.7Cr0.3Ni3 phase, namely: 1) NiAl lamellar particles (BCC phase) and 2) AlCrNi2 rounded particles (FCC phase). Moreover, NiAl and AlCrNi2 phases are present either in separately positioned groups or groups of single-phase grains, along the boundaries of which there are Cr23C6 carbide phase particles. Al0.7Cr0.3Ni3, AlCrNi2 and NiAl phases are found in the specimen subsurface both before and after carbonitriding. The alloy matrix is still Al0.7Cr0.3Ni3 phase. However, carbonitriding causes partial delamination of Al0.7Cr0.3Ni3 and AlCrNi2 solid solutions, which is evidenced by the deterioration (satellites and strands of the main reflections) of their diffraction patterns and a salt/pepper contrast presenting on TEM images. The formation of nanoscale Cr2N particles occurs inside Al0.7Cr0.3Ni3 grains. © 2019 Author(s).