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V.I. Parfenyuk [1,2], M.V. Tesakova[1], S.A. Kusmanov[2],
E.V. Parfenyuk [1], P.N. Belkin [2], G.A. Krestov [1]
Institute of Solution Chemistry of the Russian Academy of Sciences, Ivanovo, Russia
[2]KostromaStateUniversity, Kostroma, Russia

MORPHOLOGY AND SURFACE PROPERTIES OF TITANIUM ALLOY VT 6 AFTER PLASMA ELECTROLYTIC TREATMENT

Surface modification of titanium alloy VT 6 in aqueous solution containing 5 wt% of ammonium hydrate and 10 wt% of ammonium chloride in a temperature range of 650-900 ºC by plasma electrolitic treatment was carried out. Characterization of surface layers of the alloy after plasma electrolytic treatment was done by Fourier Transform Infrared spectroscopy (FTIR) and powder X-ray diffraction (XRD). The FTIR spectra were recorded on a spectrometer BrukerVertex80 at room temperature in the range 7500-350 cm^{-1}. The spectra are presented in Figure. 1.

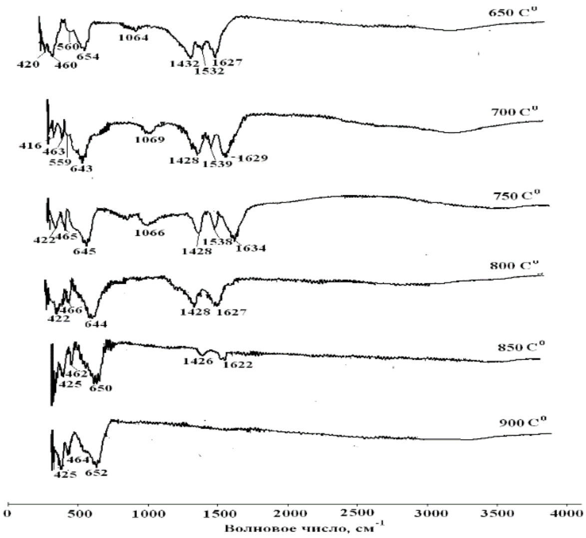

Figure 1 – FTIR spectra of titanium alloy VT 6 in aqueous electrolyte solution containing 5wt.% of NH_4OH and 10 wt.% of NH_4Cl in a temperature range of 650-900 ºC.

The spectra show the presence of rutile phase on the alloy surface after the plasma electrolytic treatment in the electrolyte solution of the indicated composition. The intensive peaks at 654-643 cm^{-1}, the weak peaks about 560 cm^{-1} and the peaks at 425-416 cm^{-1} can be assigned to rutile. The peaks at 466-462 cm^{-1} are related to Ti-O-Ti stretching vibrations. With increasing temperature the relative intensity of the peaks assigned to rutile increases. The plasma electrolytic treatment leads to appearence of the peaks testifying about enrichment of the alloy surface by nitrogen: the peaks at 1634-1622 см$^{-1}$ can be assigned to asymmetric bending of NH_4^+; the peaks about 1539 cm^{-1} are related to N-H bending or symmetric bending of NH_4^+. The peaks about 1428-1426 cm^{-1} can be also assigned to NH_4^+ bending vibrations. The plasma electrolytic treatment in the temperature range of 650-750 ºC results in appearance of the peaks at 1069-1064 см$^{-1}$. According to literature data, the peaks can be assigned to vibrations of Ti-O-N.

X-ray diffraction analysis allowed to ascertain crystal structure, phase identification of the titanium alloy VT 6 after its plasma electrolytic treatment. The measurements were performed using a Bruker D8 Advance diffractometer with Mo K_α radiation (λ=0.07107 nm). Analysis of XRD patterns showed that titanium oxide in the samples is present as hongquiite phase (γ- monoclinic singony) and magnesium phase (hexagonal singony). Besides the peaks of TiO, the peaks which are characteristic for hamrabevit TiC in halite phase (cubic syngony) and Ti_2O_3 in corundum phase (trigonal syngony) were observed.

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А.А. Васильева, Ю.В. Жарновникова, Н.В. Евреинова
СПбГТИ(ТУ), г. Санкт-Петербург

КОМПОЗИЦИОННЫЕ ЭЛЕКТРОХИМИЧЕСКИЕ ПОКРЫТИЯ НА ОСНОВЕ МЕДИ, МОДИФИЦИРОВАННЫЕ ОДНОСТЕННЫМИ УГЛЕРОДНЫМИ НАНОТРУБКАМИ

Медные покрытия находят широкое применение в качестве подслоя при нанесении многослойных покрытий, для улучшения пайки, а также для увеличения электропроводности. В современной гальванотехнике весьма актуально создание композиционных электрохимических покрытий (КЭП). Получение КЭП основано на том, что в электролит вводят суспензии дисперсных частиц, которые соосаждаются вместе с металлом, включаясь в покрытие с изменением его свойств.

В данной работе для осаждения покрытия использовали аммонийный электролит следующего состава: $CuSO_4{\bullet}5H_2O$ – 90 г/л, $(NH_4)_2SO_4$ – 80 г/л, NH_4NO_3 – 40 г/л, NH_4OH (25 %-ый) – 180 мл/л, pH=8,5 – 9,0, рабочая плотность тока $i_к$=3 – 5,5 А/дм^2. В процессе ра-