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**Formation of zirconia tetragonal phase by plasma electrolytic oxidation of zirconium alloy in electrolyte comprising additives of yttria nanopowder**

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**Abstract**

The structure and composition of ceramic coatings formed by plasma electrolytic oxidation (PEO) of Zr-1% Nb alloy under AC conditions in silicate-hypophosphite electrolyte with additives of yttria nanopowder have been analyzed by scanning electron microscopy, X-ray microanalysis and XRD analysis. The yttria nanopowder in electrolyte leads to formation of additional thin superficial layer enriched in conglomerates  $Y_2O_3$  nanoparticles. The yttria leads to inhibition of low-temperature m-ZrO<sub>2</sub> phase in PEO coating. After addition of 6 g/L yttria nanopowder in the electrolyte only t-ZrO<sub>2</sub> phase was found in the coating surface layer. The excess part of  $Y_2O_3$  nanoparticles is not involved in the PEO process of zirconia formation and remains in the PEO coatings in the form of inclusions.

**Keywords:** Zr-Nb alloy; yttria nanopowder, plasma electrolytic oxidation; coating morphology and structure; monoclinic and tetragonal zirconia

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