Microscopy of Nanoobjects

Morphological and structural peculiarities of electrolytic nano-sized powders of tungsten carbides

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Tungsten carbides (WC and W_2C) are known for their exceptional tribo-mechanical properties. They are extensively used in cutting and mining tools, surface coatings, chemical and electronic industries. Apart from mechanical properties, carbides (especially WC) possess good catalytic properties. It is considered as an economical alternative to precious noble metal platinum used in fuel cells [1]. For the goal-directed use of WC as the electrocatalyst it is necessary that carbide had the following characteristics: high specific surface and porosity, nano sizes of grains, constancy and reproducibility of surface structure. It is important to emphasize a necessity of the development of one-stage production method of composite materials based on WC with Pt during the synthesis for synergetic effect of catalysis. The high-temperature electrochemical synthesis (HTES) of tungsten carbides in molten salts meets all specified requirements [2].

The present work is devoted to investigations of the phase and element composition, morphology, structure, surface state of the single-phase nano-dimensional powders of WC and W_2C, of composite mixes on their basis, produced by the HTES, and of influences of synthesis parameters on these properties. The following research methods XRD, SEM, TEM, ED, Raman spectroscopy, BET were applied for characterization of powders.

1. *Harnisch F., Schroder U., Quaas M., Scholz F*., Electrocatalytic and corrosion behaviour of tungsten carbide in near-neutral pH electrolytes// Applied Catalysis B: Environmental. -2009. – v. 87. – p. 63–69.
2. *Novoselova I.A., Nakoneshnaja E.P., Karpushin N.A., Bykov V.N., Dovbeshko G.I., Rynder A.D.* Electrochemical synthesis of composite materials based on the nanoscale powders of tungsten carbides in molten salts // Metal Physics and Advanced Technologies – 2014. – in print.