Physico-Chemical nanomaterials science

Thermal stability of electrolytic nanocrystalline WC.

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Determination of WC nanopowders stability **against air oxygen** is a necessary prerequisite for their targeted use in the production of hard alloys and in the manufacture of electrodes for electrocatalysis. The oxidation of electrolytic nanopowders of tungsten monocarbide with an average grain size of 10-15 nm in the temperature range 20-900°C in air at a heating rate of 10 °/min was studied by methods of differential thermal thermogravimetric analysis, X-ray diffraction and SEM. Changes in the composition and morphology of the powders as a result of partial and complete oxidation were also studied.

The following oxidation stability parameters of WC were established:

(1) the temperature of the beginning of oxidation ($T_{beg.}$) – 410°C;
(2) the temperature of the oxidation end (T_{end}) – 680°C;
(3) the maximum oxidation rate (mg/min) - 0.0126;
(4) the degree of conversion (degree of oxidation) of the WC powders to WO_3 in the temperature range up to 900°C (δ,%) - 100%;

It was established that, the WC needle structures acquire a "bud-like" view (Fig. 1) as a result of annealing in air at 400°C for 1 h.

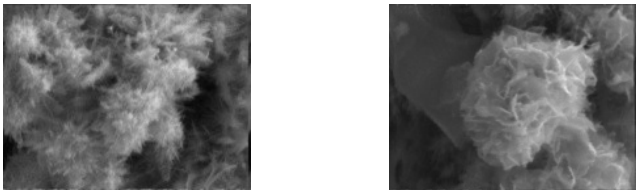

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Fig. 1 Changes in the morphology of WC powder upon annealing in air at 400°C