# EFFECT OF PRECURSOR MASS ON PRODUCT PHASE COMPOSITION IN PLASMA DYNAMIC SYNTHESIS OF TUNGSTEN CARBIDE

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An interest in cubic tungsten carbide WC1-x results from its catalytic properties similar to those of platinum group metals and the synergistic effect between WC1-x and Pt in reactions of hydrogen evolution and hydrogen oxidation. However, according to the phase diagram of the W–C system, the cubic phase WC1-x only exists in a narro.w range of temperature stability (about 2798–3058 K), which makes it difficult for being obtained. To date, there are different methods for synthesizing tungsten carbide powder with a low content of cubic phase that complicates the study of WC1-x properties. A direct plasma dynamic synthesis is known as one of the promising methods to produce WC1-x.

The aim of this work is to find the optimal amount of tungsten precursor to obtain cubic tungsten carbide with a high purity by plasma dynamic method. The synthesized products were examined by X-ray diffraction (XRD) and transmission electron microscopy (TEM). The XRD patterns showed that the main phase was cubic tungsten carbide with negligible content of hexagonal tungsten carbide W2C and pure tungsten W. According to a quantitative analysis of synthesized products, which were obtained using masses of initial tungsten equal to 1.0, 0.7, 0.6 and 0.5 g, the yield of WC1-x phase was 84, 89, 95 and 92 % (wt.), respectively. The results of TEM displayed that the synthesized powders consist of crystallites, having sizes less than 100 nm (WC1-x), and a carbon matrix. This carbon was not detected in XRD due to its presence like an amorphous phase.

***Keywords:*** *Plasma dynamic synthesis, Electrodischarge plasma, Cubic tungsten carbide, Nanoscale powder.*