

Investigation of Uranium content in RF beryllium

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At present, beryllium is considered as a base coating material for the first wall of the ITER reactor, and as neutron multiplier of breeding blanket in future commercial power thermonuclear reactors, similar to the DEMO reactor. Due to neutron transmutation beryllium becomes radioactive when interacting with the neutrons formed in the cores of fission and fusion reactors. In spite of the fact that traditionally pure beryllium is referred to the class of weakly activated materials, however, impurities available in commercial beryllium can create a considerable radioactivity. Uranium represents one of the impurities strongly effecting on a total activation of beryllium due to the formation of long-lived actinides (e.g. ²³⁹Pu, ²⁴¹Am). From the safety requirements U content in the beryllium should be as low as it is possible (less than 10 ppm, at least). Neither in former USSR nor in RF uranium has not been entered into the list of restricted impurities in chemical composition of Be. A lack of reliable data has stimulated the research directed on the creation of new database on U content.

This paper presents the results of the investigation of U content in RF beryllium. Chemical composition of more than 35 beryllium samples and semi-products of different history have been investigated. The influence of different technological steps (vacuum induction casting, vacuum distillation, etc.) on the efficiency of Be purification from U impurities is analyzed. The results of calculation on the influence of U content on an activation of beryllium are also presented.

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