Purification of Hafnium Metal Sponge by Electron Beam Melting

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Abstract. Purification of Hf sponge with 97.931 mass % by electron beam melting (EBM) has been carried out and the removal behavior of various impurity elements (metallic and non-metallic) has been examined. The influence of factors and process parameters of EBM, determining refining processes, was studied. Many metallic impurities (such as Cr, Si, Ti, Zn, Cu, Ni, etc.) in the melted Hf were removed to very low levels. Then the purity of Hf were improved to nearly 99.07% after 11 min of EBM with 11.25 kW beam power and oxygen concentration was decreased from nearly 300 ppm to less than 10 ppm. The results from a microstructural study of the samples after the electron beam processing are presented. The results obtained show high efficiency of the EB melting of the Hf sponge.