OBTAINING OF THE TITANIUM POWDER FOR ADDITIVE TECHNOLOGIES BY HYDROGENATION

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Today, a growing number of companies in various industries are turning to additive technologies [1]. The most promising materials are different metals including powders of titanium alloys. Existing methods of metal powders producing on the background of their advantages have a number of disadvantages [2]. In this regard, research in the field of powder metallurgy has gained relevance. In this paper a method of producing titanium powder by hydrogenation is proposed.

For the study, flat samples of commercially pure titanium were prepared. Samples were subjected to mechanical polishing to remove surface dirt. Nickel layer was coated by magnetron sputtering method for deposition time equals to 10 minutes. Nickel coating on the surface increases the rate of hydrogen sorption [3].

Hydrogenation of the samples was produced from the gas environment in the LP Gas Reaction Controller. Obtained brittle metal was subjected to grinding in a planetary type of ball mill. X-ray diffraction analysis of the obtained material was carried out at Shimadzu diffractometer XRD-7000S. Scanning electron microscopy was performed for evaluation of the powder fractions size. The hydrogen concentration in the powder was measured using RHEN602 analyzer.

Dehydrogenation was carried out by step scheme of annealing. After each cycle of dehydrogenation XRD analysis and scanning electron microscopy were carried out.

As a result, in present work the methodology of producing titanium powder by hydrogenation is demonstrated. The proposed hydrogenation parameters allow obtaining a powder with dispersion of micron order. The step-annealing scheme allows gradually removing hydrogen from metal powder. For the purpose of the additive technologies regular spherical particle shape and a specific dispersion are required. Problems of spheroidization and the desired range of isolating fractions require further research.

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ФРАКЦИОНИРОВАНИЕ ИЗОТОПОВ ЛИТИЯ И МАГНИЯ ПРИ ЗОННОЙ ПЛАВКЕ

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Природный литий является смесью двух стабильных изотопов ^{6}Li (7,589 %) и ^{7}Li (92,411 %) [1], каждый из которых имеет большое значение, особенно в ядерной энергетике. ^{7}Li в виде гидроксида лития используется в качестве добавки в теплоноситель первого контура водо-водяных ядерных реакторов для