Журнал Сибирского федерального университета
Journal of Siberian Federal University 2014 7 (1)

Техника и технологии
Engineering & Technologies

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Редактор **И.А. Вейсиг** Корректор **Е.Г. Иванова**
Компьютерная верстка **Е.В. Гревцовой**

Подписано в печать 27.01.2014 г. Формат 84x108/16. Усл. печ. л. 10,1. Уч.-изд. л. 9,6. Бумага тип. Печать офсетная. Тираж 1000 экз. Заказ 841. Отпечатано в ПЦ БИК СФУ. 660041, Красноярск, пр. Свободный, 82а.

Свидетельство о регистрации СМИ ПИ № ФС77-28-722 от 29.06.2007 г.

Серия включена в «Перечень ведущих рецензируемых научных журналов и изданий, в которых должны быть опубликованы основные научные результаты диссертации на соискание ученой степени доктора и кандидата наук» (редакция 2010 г.)

Journal of Siberian Federal University. Engineering & Technologies 1 (2014 7) 3-12
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УДК 504.5: 620.193.16

Hydrodynamic Dispersion of Calcium Aluminosilicate from Technogenic and Nonmetallic Materials

Liudmila V. Kashkina[a], Olesya P. Stebeleva[a]*, Tatiana Y. Emelyanova[a], Eleonora A. Petrakovskaya[b] and Oleg A. Bayukov[b]

[a]Siberian Federal University, 79 Svobodny, Krasnoyarsk, 660041, Russia

[b]L.V. Kirensky Institute of Physics SB RAS 50/38 Akademgorodok, Krasnoyarsk, 660036, Russia

Received 05.12.2013, received in revised form 18.12.2013, accepted 24.01.2014

Physicochemical properties of two calcium aluminosilicate materials after reducing in the hydrodynamic rotary generator in supercavitation mode were studied. The samples are the crystal ceramic foam based on Kansko-Achinsk lignite-ash and the porous glass material obtained from low-manganese nonmetallic feed. X-ray phase analysis, EPR-method, NPR-method (the Mossbauer Effect) and optical microscopy were used. It was found that the material is changing its stucrure in a hydrodynamic dispersion process caused by high-cavitation. The nature of the changes depends on its initial state.

Keywords: hydrodynamic dispersion, cavitation, crystal ceramic foam, porous glass material.

Introduction

Currently, treatment processes of technogenic materials allowing not only to extract the most valuable components of the waste, but also to obtain new materials with desired properties are developed and implemented. However, these technologies are energy intensive, since more than 50 % of the energy consumed for cominution of the basic substance. Recent studies have shown that energetically low-cost technology of hydrodynamic dispersion (crushing in a liquid medium) can be successfully used for fine powdering [1-8]. In [8] it was shown that used rotary hydrodynamic generator of low productivity under specified modes for 1 minute of dispersion at the initial average ash size of 175 microns produces an particle with average size of 25 microns, i.e. ash particles are “grind down” by almost 7 times (the concentrations less than 3 wt %). If dispersed ash with an average initial size of 25 microns under the same conditions, then the output can be obtained particles having an average particle size of 3,5 – 4 mkm. Thus, in two phases (2 min. dispersion) particle size can be reduced from 175 microns to 4 microns, i.e. by more than 40 times. At higher

* Corresponding author E-mail address: olessteb@rambler.ru