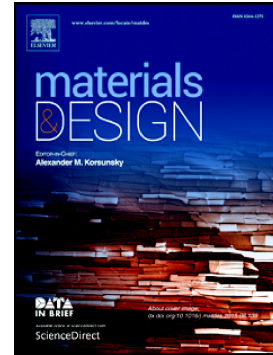


Accepted Manuscript

Synthesis and characterization of economical, multi-functional porous ceramics based on abundant aluminosilicates

Hussam Alghamdi, Akash Dakhane, Absar Alum, Morteza Abbaszadegan, Barzin Mobasher, Narayanan Neithalath



PII: S0264-1275(18)30338-1
DOI: doi:[10.1016/j.matdes.2018.04.060](https://doi.org/10.1016/j.matdes.2018.04.060)
Reference: JMADE 3873
To appear in: *Materials & Design*
Received date: 6 March 2018
Revised date: 23 April 2018
Accepted date: 24 April 2018

Please cite this article as: Hussam Alghamdi, Akash Dakhane, Absar Alum, Morteza Abbaszadegan, Barzin Mobasher, Narayanan Neithalath , Synthesis and characterization of economical, multi-functional porous ceramics based on abundant aluminosilicates. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Jmade(2017), doi:[10.1016/j.matdes.2018.04.060](https://doi.org/10.1016/j.matdes.2018.04.060)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Synthesis and Characterization of Economical, Multi-functional Porous Ceramics based on Abundant Aluminosilicates

Hussam Alghamdi¹, Akash Dakhane², Absar Alum³, Morteza Abbaszadegan⁴, Barzin Mobasher⁵, Narayanan Neithalath^{6,*}

Abstract

This paper reports synthesis routes and microstructural and performance characterization of a family of economical, multifunctional porous ceramics developed through geopolymerization of an abundant volcanic tuff (aluminosilicate mineral) as the primary source material. Metakaolin, silica fume, alumina powder, and pure silicon powder are also used as additional ingredients when necessary, and activated by potassium-based alkaline agents. The composition and heat treatment regimes are modified to provide the desired pore structure features for percolation, contaminant retention, and thermal conductivity. The treatment temperatures used are lower than those used in conventional porous ceramics synthesis. Extensive microstructural characterization using different techniques to examine the morphology and to quantify the pore volumes, sizes, and connectivity, which are important in dictating the performance characteristics, are reported. Measurements of flow rates and thermal conductivity demonstrate the multifunctionality of the synthesized matrices, which demonstrate adequate strengths for a number of buildings-related applications.

Keywords: Aluminosilicate; Geopolymer; Porous ceramics; Pore structure; Thermal conductivity; Permeability

¹ Graduate student, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe AZ 85287

² Graduate student, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe AZ 85287

³ Research Assistant Professor, Water and Environment Technology Center, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe AZ 85287

⁴ Director, Water and Environment Technology Center, and Professor, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe AZ 85287

⁵ Professor, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe AZ 85287

^{6,*} Professor, School of Sustainable Engineering and Built Environment, Arizona State University, Tempe AZ 85287; Corresponding Author (Phone: +1-480-965-6023; Fax: +1-480-965-0557; e-mail: Narayanan.Neithalath@asu.edu)

Download English Version:

<https://daneshyari.com/en/article/7216986>

Download Persian Version:

<https://daneshyari.com/article/7216986>

[Daneshyari.com](https://daneshyari.com)