

Large-scale and ultra-low thermal conductivity of
 ZrO_2 fibrofelt / ZrO_2 - SiO_2 aerogels composites for
thermal insulation

Jian He, Hangyuan Zhao, Xiaolei Li, Dong Su,
Huiming Ji, Huijun Yu, Zhipeng Hu



PII: S0272-8842(18)30102-0
DOI: <https://doi.org/10.1016/j.ceramint.2018.01.089>
Reference: CERI17221

To appear in: *Ceramics International*

Received date: 2 September 2017
Revised date: 28 November 2017
Accepted date: 11 January 2018

Cite this article as: Jian He, Hangyuan Zhao, Xiaolei Li, Dong Su, Huiming Ji, Huijun Yu and Zhipeng Hu, Large-scale and ultra-low thermal conductivity of ZrO_2 fibrofelt / ZrO_2 - SiO_2 aerogels composites for thermal insulation, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.01.089>

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 galley proof before it is published in its final citable 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.

Large-scale and ultra-low thermal conductivity of ZrO₂ fibrofelt / ZrO₂-SiO₂ aerogels composites for thermal insulation

Jian He,^a Hangyuan Zhao,^a Xiaolei Li,^{*a} Dong Su,^{*a} Huiming Ji,^a Huijun Yu,^a

Zhipeng Hu^a

^aSchool of Materials Science and Engineering of Tianjin University, Key Lab of Advanced Ceramics and Machining Technology of Ministry of Education, Tianjin 300072, China

Abstract: The large-scale fibrous/aerogels composites are prepared by using zirconia fibrofelt (ZFF) as skeleton to give high strength and ZrO₂-SiO₂ aerogels (ZSA) as filler to give excellent thermal insulation through vacuum impregnation. The ZFF/ZSA with a low density of 0.302g/cm³ and a high porosity (89%) exhibits large size of 180 mm in length, 180 mm in width and 25 mm in height which is larger than other fibrous aerogels. Meanwhile, the ZFF/ZSA exhibits high compressive strength of up to 0.17 MPa which is approximately six times higher than that of ZFF (0.028MPa). The ZFF/ZSA shows a much lower thermal conductivity of 0.0341 W·m⁻¹·K⁻¹ at room temperature and 0.0460 to 0.096·m⁻¹·K⁻¹ during 500°C and 1100°C which are lower than that of conventional fibrous materials, indicating its excellent thermal insulation property in a wide temperature range, and the thermal insulation mechanism is analyzed. Thus, the large-scale, low density, high strength,

¹ ¹ *Corresponding author. Tel.: +86 13332055584; fax: +86 022 24406114

E-mail address: lxlei@tju.edu.cn

² *Corresponding author. Tel.: +86 13920782557; fax: +86 022 24406114

E-mail address: sudong@tju.edu.cn

Download English Version:

<https://daneshyari.com/en/article/7887293>

Download Persian Version:

<https://daneshyari.com/article/7887293>

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