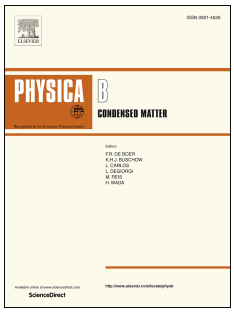
Accepted Manuscript



Influence factors of the inter-nanowire thermal contact resistance in the stacked nanowires

Dongxu Wu, Congliang Huang, Jinxin Zhong, Zizhen Lin

PII: S0921-4526(18)30124-8

DOI: 10.1016/j.physb.2018.02.016

Reference: PHYSB 310733

To appear in: *Physica B: Physics of Condensed Matter*

Received Date: 12 January 2018

Revised Date: 8 February 2018

Accepted Date: 9 February 2018

Please cite this article as: D. Wu, C. Huang, J. Zhong, Z. Lin, Influence factors of the inter-nanowire thermal contact resistance in the stacked nanowires, *Physica B: Physics of Condensed Matter* (2018), doi: 10.1016/j.physb.2018.02.016.

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.

ACCEPTED MANUSCRIPT

Influence Factors of the Inter-Nanowire Thermal Contact Resistance in the Stacked Nanowires

Dongxu Wu [1], Congliang Huang [1, a)], Jinxin Zhong [1] and Zizhen Lin [1]

1 School of Electrical and Power Engineering, China University of Mining and Technology, Xuzhou 221116, China.

a) Author to whom correspondence should be addressed. E-mail: huangcl@cumt.edu.cn.

Abstract: The inter-nanowire thermal contact resistance is important for tuning the thermal conductivity of a nanocomposite for thermoelectric applications. In this paper, the stacked copper nanowires are applied for studying the thermal contact resistance. The stacked copper nanowires are firstly made by the cold-pressing method, and then the nanowire stacks are treated by sintering treatment. With the effect of the volumetric fraction of nanowires in the stack and the influence of the sintering-temperature on the thermal contact resistance discussed, results show that: The thermal conductivity of the 150-nm copper nanowires can be enlarged almost 2 times with the volumetric fraction increased from 32 to 56 % because of the enlarged contact-area and contact number of a copper nanowire. When the sintering temperature increases from 293 to 673 K, the thermal conductivity of the stacked 300-nm nanowires could be enlarged almost 2.5 times by the sintering treatment, because of the improved lattice property of the contact zone. In conclusion, application of a high volumetric fraction or/and a sintering-treatment are effectivity to tune the inter-nanowire thermal contact resistance, and thus to tailor the thermal conductivity of a nanowire network or stack.

Keywords: Stacked nanowire; network; thermal conductivity; thermal contact resistance; nanocomposite.

ACCEPTED MANUSCRIPT

Download English Version:

https://daneshyari.com/en/article/8160837

Download Persian Version:

https://daneshyari.com/article/8160837

Daneshyari.com