

Accepted Manuscript

Achieving thermoelectric improvement through the addition of a small amount of graphene to CuAlO₂ synthesized by solid-state reaction

Noppanut Daichakomphu, Rachsak Sakdanuphab, Adul Harnwunggmoung, Supree Pinitsoontorn, Aparporn Sakulkalavek

PII: S0925-8388(18)31599-8

DOI: [10.1016/j.jallcom.2018.04.276](https://doi.org/10.1016/j.jallcom.2018.04.276)

Reference: JALCOM 45914

To appear in: *Journal of Alloys and Compounds*

Received Date: 8 February 2018

Revised Date: 23 April 2018

Accepted Date: 24 April 2018

Please cite this article as: N. Daichakomphu, R. Sakdanuphab, A. Harnwunggmoung, S. Pinitsoontorn, A. Sakulkalavek, Achieving thermoelectric improvement through the addition of a small amount of graphene to CuAlO₂ synthesized by solid-state reaction, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.04.276.

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.



Achieving thermoelectric improvement through the addition of a small amount of graphene to CuAlO₂ synthesized by solid-state reaction

Noppanut Daichakomphu¹, Rachsak Sakdanuphab², Adul Harnwunggmoung³, Supree Pinitsoontorn⁴, Aparporn Sakulkalavek^{1*}

¹Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Chalongkrung Rd. Ladkrabang, Bangkok 10520, Thailand

² College of Advanced Manufacturing Innovation, King Mongkut's Institute of Technology Ladkrabang, Chalongkrung Rd. Ladkrabang, Bangkok 10520, Thailand

³Department of Physics, Faculty of Science and Technology, Rajamangala University of Technology Suvarnabhumi, Nonthaburi 11000, Thailand

⁴Integrated Nanotechnology Research Center, Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen 40002, Thailand

*Corresponding author. Email: aparporn.sa@kmitl.ac.th

Abstract

In this work, delafossite CuAlO₂ powders with graphene (0.00 to 0.20 wt.%) were synthesized by a solid-state reaction method. X-ray diffraction and transmission electron microscope results indicated that graphene was segregated in CuAlO₂ as a split phase, such as composite material. A little addition of graphene content reduces the thermal conductivity and increases the carrier concentration because the graphene generates many point defects and aided carrier-phonon scattering. The CuAlO₂ with graphene content of 0.05 wt.% shows the maximum electrical conductivity of 470 S/m at 700 K. In addition, the maximum value for ZT of 0.0045 was recorded at 575 K with the graphene/CuAlO₂ composite (0.05 wt.%). Therefore, in brief, this study has highlighted the benefits of combining delafossite CuAlO₂ with a small amount of graphene as a potential route for achieving highly efficient thermoelectric materials.

Download English Version:

<https://daneshyari.com/en/article/7991601>

Download Persian Version:

<https://daneshyari.com/article/7991601>

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