

[Submit to this Journal](#)[Review for this Journal](#)[Edit a Special Issue](#)

Article Menu

Article Overview

- Abstract
- Open Access and Permissions
- Share and Cite
- Article Metrics
- Author Biographies
- Order Article Reprints

Article Versions

Related Info Links

More by Authors Links

Abstract Views 642

Full-Text Views 488



9th International
Symposium on
Sensor Science

Open Access Article

Silicone Elastomer Composites Fabricated with MgO and MgO-Multi-Wall Carbon Nanotubes with Improved Thermal Conductivity

by  Christopher Kagenda^{1,2,†}  Jae Wook Lee^{3,†}  Fida Hussain Memon^{3,4}  Faheem Ahmed³  Anupama Samantasinghar³  Muhammad Wasim Akhtar^{2,5,*}  Abdul Khalique⁵ and  Kyung Hyun Choi^{3,*}

¹ Faculty of Science, Faculty of Chemistry, Chemical Engineering, Kyambogo University, Kampala P.O. Box 1, Uganda

² School of Semiconductor and Chemical Engineering, Chonbuk National University, Jeonju-si 54896, Korea

³ Advanced Micro Mechatronics Laboratory, Department of Mechatronics Engineering, Jeju National University, Jeju-si 63243, Korea

⁴ Department of Electrical Engineering, Sukkur IBA University, Sukkur 65200, Pakistan

⁵ Department of Metallurgy and Materials Engineering, Mehran University of Engineering & Technology, Jamshoro 76062, Pakistan

* Authors to whom correspondence should be addressed.

† Authors contributed equally.

Academic Editor: Shenmin Zhu

Nanomaterials **2021**, *11*(12), 3418; <https://doi.org/10.3390/nano11123418>

Received: 31 October 2021 / Revised: 7 December 2021 / Accepted: 10 December 2021 / Published: 16 December 2021

(This article belongs to the Special Issue Nanocomposite Based on Graphene or Porous Carbon and Exploring Its Application)

[View Full-Text](#)[Download PDF](#)[Browse Figures](#)[Citation Export](#)

Abstract

The effect of multiwall carbon nanotubes (MWCNTs) and magnesium oxide (MgO) on the thermal conductivity of MWCNTs and MgO-reinforced silicone rubber was studied. The increment of thermal conductivity was found to be linear with respect to increased loading of MgO. In order to improve the thermal transportation of phonons 0.3 wt % and 0.5 wt % of MWCNTs were added as filler to MgO-reinforced silicone rubber. The MWCNTs were functionalized by hydrogen peroxide (H₂O₂) to activate organic groups onto the surface of MWCNTs. These functional groups improved the compatibility and adhesion and act as bridging agents between MWCNTs and silicone elastomer, resulting in the formation of active conductive pathways between MgO and MWCNTs in the silicone elastomer. The surface functionalization was confirmed with XRD and FTIR spectroscopy. Raman spectroscopy confirms the pristine structure of MWCNTs after oxidation with H₂O₂. The thermal conductivity is improved to 1 W/m·K with the addition of 20 vol% with 0.5 wt % of MWCNTs, which is an ~8-fold increment in comparison to neat elastomer. Improved thermal conductive properties of MgO-MWCNTs elastomer composite will be a potential replacement for conventional thermal interface materials. [View Full-Text](#)

Keywords: thermal conductivity; silicone elastomer; multi wall carbon nanotubes

