

Accepted Manuscript

A novel thermally conductive transparent die attach adhesive for high performance LEDs

Kai Zhang, Guowei David Xiao, Zhaoming Zeng, Chuiming Wan, Jie Li, Shihan Xin, Xiaowu He, Shaojia Deng, Yu Zhang, Chengqiang Cui, Yunbo He, Lisa Liu, Cheng Sheng Ku, Matthew M.F. Yuen

PII: S0167-577X(18)31558-1
DOI: <https://doi.org/10.1016/j.matlet.2018.09.170>
Reference: MLBLUE 25042

To appear in: *Materials Letters*

Received Date: 6 August 2018
Revised Date: 24 September 2018
Accepted Date: 30 September 2018

Please cite this article as: K. Zhang, G.D. Xiao, Z. Zeng, C. Wan, J. Li, S. Xin, X. He, S. Deng, Y. Zhang, C. Cui, Y. He, L. Liu, C.S. Ku, M.M.F. Yuen, A novel thermally conductive transparent die attach adhesive for high performance LEDs, *Materials Letters* (2018), doi: <https://doi.org/10.1016/j.matlet.2018.09.170>

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.



A novel thermally conductive transparent die attach adhesive for high performance LEDs

Kai Zhang^{a,b,*}, Guowei David Xiao^c, Zhaoming Zeng^c, Chuiming Wan^c, Jie Li^b, Shihan Xin^a, Xiaowu He^a, Shaojia Deng^a, Yu Zhang^a, Chengqiang Cui^a, Yunbo He^a, Lisa Liu^d, Cheng Sheng Ku^d,
Matthew M. F. Yuen^b

^a Key Laboratory of Precision Microelectronic Manufacturing Technology & Equipment of Ministry of Education, Guangdong University of Technology, Guangzhou 510006, China

^b Department of Mechanical and Aerospace Engineering, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong SAR China

^c APT Electronics Co., Ltd., 33 South of Huan Shi Road, Guangzhou 511458, China

^d Lumileds (Shanghai) Management Co., Ltd., 5/F, No.9 Building, 888 Tian Lin Road, Shanghai 200233, China

*Corresponding author, Email: zhangkai@gdut.edu.cn

Abstract

High thermal conductivity, low viscosity and high transparency are desired properties of die attach adhesives (DAA) for LEDs to achieve high thermal and optical performance as well as good reliability. However, it is challenging for DAAs with thermally conductive fillers to keep a low viscosity and high transparency. In this paper, a novel DAA with designed hyper-branched epoxy-silicone and surface modified fused silica was formulated to improve the thermal conductivity without sacrificing high transparency and low viscosity. Compared with a widely used commercial DAA, 165% thermal conductivity improvement and 83% viscosity reduction are achieved, resulting in 26% thermal resistance reduction, 7% light extraction enhancement, and 14% less lumen degradation in accelerate aging test for mid-power LED packages.

Keywords:

Die attach adhesive, Light emitting diode, Thermal properties, Polymeric composites, Light extraction

1. Introduction

With advantages of energy saving and environment-friendly [1], LEDs are becoming the major solution for general lighting in the world wide. Low-power and mid-power LEDs dominate general lighting and liquid crystal display (LCD) backlighting applications because of their relatively high performance to cost ratio, better light uniformity and light output control [2]. Multiple LED arrays and high forward current are generally used to increase the total light output. As a result, the junction

Download English Version:

<https://daneshyari.com/en/article/11263102>

Download Persian Version:

<https://daneshyari.com/article/11263102>

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