

## Accepted Manuscript

On adhesive properties of Nano-silica/epoxy bonded single-lap joints

He-Le-Zi Zhou, Hong-Yuan Liu, Huamin Zhou, Yun Zhang, Xiping Gao, Yiu-Wing Mai

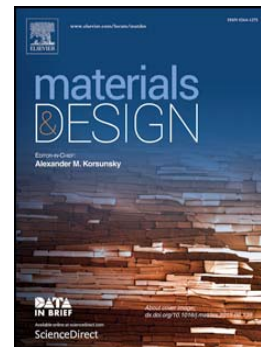
PII: S0264-1275(16)30055-7  
DOI: doi: [10.1016/j.matdes.2016.01.055](https://doi.org/10.1016/j.matdes.2016.01.055)  
Reference: JMADE 1256

To appear in:

Received date: 25 November 2015  
Revised date: 12 January 2016  
Accepted date: 13 January 2016

Please cite this article as: He-Le-Zi Zhou, Hong-Yuan Liu, Huamin Zhou, Yun Zhang, Xiping Gao, Yiu-Wing Mai, On adhesive properties of Nano-silica/epoxy bonded single-lap joints, (2016), doi: [10.1016/j.matdes.2016.01.055](https://doi.org/10.1016/j.matdes.2016.01.055)

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.



## ON ADHESIVE PROPERTIES OF NANO-SILICA/EPOXY BONDED SINGLE-LAP JOINTS

He-Le-Zi Zhou<sup>1,2</sup>, Hong-Yuan Liu<sup>2\*</sup>, Huamin Zhou<sup>1</sup>, Yun Zhang<sup>1</sup>, Xiping Gao<sup>1</sup>  
and Yiu-Wing Mai<sup>2\*</sup>

<sup>1</sup>State Key Laboratory of Materials Processing and Die & Mould Technology  
Huazhong University Science and Technology, Wuhan 430074, PR China

<sup>2</sup>Centre for Advanced Materials Technology (CAMT)  
School of Aerospace, Mechanical and Mechatronic Engineering J07  
The University of Sydney, Sydney, NSW 2006, Australia

**Keywords:** Epoxy Resin, Nano-silica, Adhesive Property, Lap-shear, Fatigue, Hygrothermal.  
Corresponding authors: hong-yuan.liu@sydney.edu.au; yiu-wing.mai@sydney.edu.au

### Highlights:

1. Incorporation of 10 and 20 wt.% of nano-silica into epoxy matrix improved the adhesive joint strength by 20%.
2. Hygrothermal treatment retained the benefit of having nano-silica than neat epoxy on the adhesive joint strength.
3. In cyclic fatigue, the dried lap-shear joints with nano-silica/epoxy adhesives have longer lifetimes than those with only neat epoxy adhesive.

### ABSTRACT

The effects of nano-silica on the adhesive properties of epoxy were systematically studied by single lap-shear tests under quasi-static and cyclic loadings. The adhesives were produced from different amount of nano-silica particles incorporated into diglycidyl ether of bisphenol-A (DGEBA) epoxy. Stainless steel plates were chosen as adherends. Quasi-static tests were conducted on single lap-shear joints at ambient, with and without exposure to 100% RH at 60 °C for different times. Cyclic fatigue tests were also performed on these bonded joints under tension-tension loading. The fracture surface morphology was examined using scanning electron microscopy (SEM) to identify the failure mechanisms. Compared to neat epoxy, it was found that the adhesive strength is increased by 20% under quasi-static loadings.

Download English Version:

<https://daneshyari.com/en/article/7218739>

Download Persian Version:

<https://daneshyari.com/article/7218739>

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