

## Author's Accepted Manuscript

Influence of laser treatment parameters on the mode I strain energy release rate of aluminum double cantilever beam joints

F. Moroni, F. Musiari, L. Romoli, A. Pirondi



PII: S0143-7496(18)30056-3

DOI: <https://doi.org/10.1016/j.ijadhadh.2018.02.023>

Reference: JAAD2148

To appear in: *International Journal of Adhesion and Adhesives*

Cite this article as: F. Moroni, F. Musiari, L. Romoli and A. Pirondi, Influence of laser treatment parameters on the mode I strain energy release rate of aluminum double cantilever beam joints, *International Journal of Adhesion and Adhesives*, <https://doi.org/10.1016/j.ijadhadh.2018.02.023>

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 galley proof before it is published in its final citable 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.

# Influence of laser treatment parameters on the mode I strain energy release rate of aluminum double cantilever beam joints

F. Moroni\*, F. Musiari, L. Romoli, A. Pirondi

Università degli Studi di Parma, Dipartimento di Ingegneria e Architettura. Parco Area delle Scienze 181/A, 43124 Parma, IT.

\*Corresponding author: [fabrizio.moroni@unipr.it](mailto:fabrizio.moroni@unipr.it) (F. Moroni)

## Abstract

Surface texturing produced by laser ablation is an efficient and effective technology for treating substrates to improve adhesive bond strength. In the literature, its effect has been extensively studied for different adherends materials, adhesives and laser sources. Laser ablation produces both morphological and chemical modifications of the surfaces, promoting mechanical interlocking and chemical bonding between the adhesive and the substrates. In this work, the effect of pulsed Yb-fiber laser ablation over the quasi-static mode I fracture energy of Double Cantilever Beam (DCB) aluminum bonded joints has been assessed for different combinations of processing parameters, with the aim of optimizing the treatment for industrial purposes. The mechanical tests show that the treatment becomes effective when a laser energy density threshold is overcome. On the other hand, a further increase in the energy density leads to a slight reduction of the joints fracture energy. This is related to the viscosity of the adhesive and to the high roughness produced by high energy treatments, resulting in the presence of air bubbles in the adhesive layer. In order to understand this phenomenon, the treated surfaces are characterized from the morphological point of view using a 3D optical profiler and SEM analysis.

## Keywords

A. Fracture Toughness, B. Surface Roughness, B. Surface Treatment, D. interfaces.

Download English Version:

<https://daneshyari.com/en/article/7170938>

Download Persian Version:

<https://daneshyari.com/article/7170938>

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