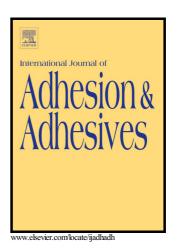
# Author's Accepted Manuscript

An investigation on effects of acid etching duration on adhesive bonding of polyethylene to E-glass/epoxy composites

R. Chitsaz Dehaghani, M.M. Shokrieh, F. Taheri-Behrooz



PII: S0143-7496(18)30167-2

DOI: https://doi.org/10.1016/j.ijadhadh.2018.06.012

Reference: JAAD2232

To appear in: International Journal of Adhesion and Adhesives

Received date: 9 May 2018 Accepted date: 5 June 2018

Cite this article as: R. Chitsaz Dehaghani, M.M. Shokrieh and F. Taheri-Behrooz, An investigation on effects of acid etching duration on adhesive bonding of polyethylene to E-glass/epoxy composites, *International Journal of Adhesion and Adhesives*, https://doi.org/10.1016/j.ijadhadh.2018.06.012

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.

## **ACCEPTED MANUSCRIPT**

# An investigation on effects of acid etching duration on adhesive bonding of polyethylene to E-glass/epoxy composites

Chitsaz Dehaghani, R.<sup>1</sup>, Shokrieh, M.M.<sup>2,\*</sup>, Taheri-Behrooz F.<sup>3</sup>

<sup>1</sup>Composites Research Laboratory, Center of Excellence in Experimental Solid Mechanics, Tehran, 16846-13114, Iran

<sup>2</sup>Dynamics, School of Mechanical Engineering, Iran University of Science and Technology, Tehran, 16846-13114, Iran

<sup>3</sup>School of Mechanical Engineering, Iran University of Science and Technology, Tehran, 16846-13114, Iran

\*Shokrieh@iust.ac.ir

#### **Abstract**

The quality of bonding between the liner and composite shell of a type IV pressure vessel is a crucial point to prevent the leakage of this vessel subjected to fill and refill cycles. In the present research, acid etching was used for surface treatment of a plastic liner to increase the bonding strength. The numerical and experimental study was conducted to investigate the effect of surface treatment duration on the adhesive bonding of E-glass/epoxy composites to the polyethylene (PE) liner. The contact angle and asymmetric double cantilever beam (ADCB) tests were performed to determine the bonding strength. According to results, by increasing acid etching exposure time, bonding strength increased and adhesive bonding became more stable. It was also found that 120 minutes acid etching exposure time of PE presented the lowest contact angle on the surface of PE; and the highest strain energy release rate (SERR) in ADCB specimens. The virtual crack closure technique was used to simulate the delamination initiation of ADCB specimens in Abaqus 6.14. The numerical results of Gc for the crack initiation deduced by the virtual crack closure technique were consistent with the experimental data. It was observed that the magnitude of  $G_{II}/G_c$  was larger than that of  $G_I/G_c$ . Also, nailing phenomenon was observed in the crack tip of ADCB specimens and was remarked as two jumps in the distribution of mode II SERR across the width of ADCB specimens.

### Download English Version:

# https://daneshyari.com/en/article/7170859

Download Persian Version:

https://daneshyari.com/article/7170859

<u>Daneshyari.com</u>