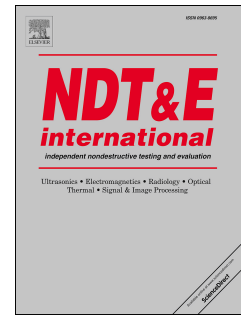


# Accepted Manuscript

Design and fabrication of direct-write piezoelectric ultrasonic transducers for determining yielding of aluminum alloy

Shifeng Guo, Shuting Chen, Lei Zhang, Yi Fan Chen, Meysam Sharifzadeh  
Mirshekarloo, Kui Yao



PII: S0963-8695(18)30052-5

DOI: [10.1016/j.ndteint.2018.05.009](https://doi.org/10.1016/j.ndteint.2018.05.009)

Reference: JNDT 1992

To appear in: *NDT and E International*

Received Date: 23 January 2018

Revised Date: 6 April 2018

Accepted Date: 18 May 2018

Please cite this article as: Guo S, Chen S, Zhang L, Chen YF, Mirshekarloo MS, Yao K, Design and fabrication of direct-write piezoelectric ultrasonic transducers for determining yielding of aluminum alloy, *NDT and E International* (2018), doi: 10.1016/j.ndteint.2018.05.009.

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.

## Design and Fabrication of Direct-write Piezoelectric Ultrasonic Transducers for Determining Yielding of Aluminum Alloy

Shifeng Guo, Shuting Chen, Lei Zhang, Yi Fan Chen, Meysam Sharifzadeh  
Mirshekarloo, and Kui Yao\*

Institute of Materials Research and Engineering, A\*STAR (Agency for Science,  
Technology and Research), #08-03, 2 Fusionopolis Way, Innovis, Singapore 138634

\* Corresponding author. E-mail contact: [k-yao@imre.a-star.edu.sg](mailto:k-yao@imre.a-star.edu.sg)

### Abstract

Direct-write piezoelectric transducers are dedicatedly designed and fabricated to generate and detect both fundamental and second harmonic Rayleigh ultrasonic waves for evaluating overload-induced plastic deformation in aluminum (Al) alloy. The Rayleigh ultrasonic signals, generated by concentric focused direct-write transducers and propagating along the Al-alloy specimens, are measured either with other direct-write transducers or laser scanning vibrometer (LSV) to obtain the fundamental and second harmonic ultrasonic signals for analyzing the acoustic nonlinearity. The results show that the acoustic nonlinearity increases over 50% when the plastic strain reaches 7.8%. In comparison with LSV, the direct-write piezoelectric transducers exhibit substantially improved consistency and repeatability in the acoustic nonlinearity measurements. Scanning electron microscopy (SEM) and X-ray diffraction (XRD) are conducted to correlate micro-structural changes with the acoustic nonlinearity in the Al alloy. The results and analyses indicate that the direct-write piezoelectric transducers with the appropriate design have significant technical advantages for acoustic nonlinearity testing and yielding determination.

Download English Version:

<https://daneshyari.com/en/article/6758238>

Download Persian Version:

<https://daneshyari.com/article/6758238>

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