

# Accepted Manuscript

Full Length Article

Subsurface damages beneath fracture pits of reaction-bonded silicon carbide after ultra-precision grinding

Zhipeng Li, Feihu Zhang, Xichun Luo

PII: S0169-4332(18)30991-7

DOI: <https://doi.org/10.1016/j.apsusc.2018.04.038>

Reference: APSUSC 39037

To appear in: *Applied Surface Science*

Received Date: 28 January 2018

Revised Date: 30 March 2018

Accepted Date: 4 April 2018

Please cite this article as: Z. Li, F. Zhang, X. Luo, Subsurface damages beneath fracture pits of reaction-bonded silicon carbide after ultra-precision grinding, *Applied Surface Science* (2018), doi: <https://doi.org/10.1016/j.apsusc.2018.04.038>

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.



# Subsurface damages beneath fracture pits of reaction-bonded silicon carbide after ultra-precision grinding

Zhipeng Li<sup>a\*</sup>, Feihu Zhang<sup>a</sup>, Xichun Luo<sup>b</sup>

<sup>a</sup> School of Mechatronics Engineering, Harbin Institute of Technology, Harbin, China

<sup>b</sup> Centre for Precision Manufacturing, DMEM, University of Strathclyde, Glasgow, UK

Corresponding author: Zhipeng Li, E-mail: [zplihit@163.com](mailto:zplihit@163.com), Telephone: +86 15004680642

## Abstract

This paper investigated the structural defects beneath the fracture area of 6H-SiC in reaction-bonded silicon carbide (RB-SiC) ceramics after ultra-precision grinding. The nano-indentation technique was used to evaluate the evolution of deformation behavior and find the critical transition condition among elastic, plastic and fracture. It was found that beneath the fracture pits, dislocations accompanied with micro-cracks (lateral and median) were the two types of subsurface damage. However, no amorphous phase was detected. In addition, a two-beam analysis confirmed that the dislocations were activated on basal  $\langle a \rangle$  and dissociated into the Shockley partial dislocations in 6H-SiC particle. The following indentation experiments revealed that the existence dislocations in the ground subsurface should be occurred earlier than cleavage. These dislocations were the predominant yielding mechanism in 6H-SiC, which initiated at a shear stress of about 23.4-28.4 Gpa through a pop-in event on load-displacement curve. Afterwards, cracks emerged when the maximum tensile stress beneath the indenter increased to 31.6

Download English Version:

<https://daneshyari.com/en/article/7833807>

Download Persian Version:

<https://daneshyari.com/article/7833807>

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