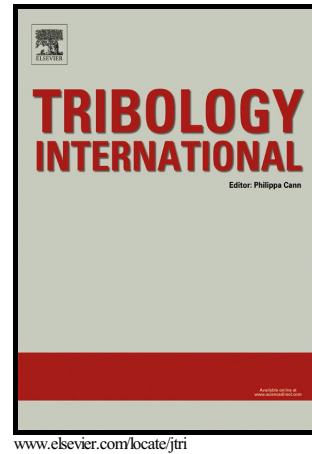


Author's Accepted Manuscript

In-situ observation of temperature rise during scratch testing of poly (methacrylate) and polycarbonate

Jianwei Zhang, Han Jiang, Chengkai Jiang, Qian Cheng, Guozheng Kang



PII: S0301-679X(15)00496-X
DOI: <http://dx.doi.org/10.1016/j.triboint.2015.10.037>
Reference: JTRI3911

To appear in: *Tribology International*

Received date: 16 September 2015
Revised date: 25 October 2015
Accepted date: 31 October 2015

Cite this article as: Jianwei Zhang, Han Jiang, Chengkai Jiang, Qian Cheng and Guozheng Kang, In-situ observation of temperature rise during scratch testing of poly (methacrylate) and polycarbonate, *Tribology International* <http://dx.doi.org/10.1016/j.triboint.2015.10.037>

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 a 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.

In-situ observation of temperature rise during scratch testing of poly (methylmethacrylate) and polycarbonate

Jianwei ZHANG, Han JIANG*, Chengkai JIANG, Qian CHENG, Guozheng Kang

Applied Mechanics and Structure Safety Key Laboratory of Sichuan Province, School of Mechanics and Engineering, Southwest Jiaotong University, Chengdu, Sichuan 610031, China

*Corresponding author. Tel: +86-28-87601442; fax: +86-28-87600797

E-mail address: jianghan@home.swjtu.edu.cn

Abstract: In this work, an in-situ observation of temperature rise during the scratch test was performed for both brittle and ductile polymeric materials, i.e., poly (methylmethacrylate) (PMMA) and polycarbonate (PC). Significant temperature rise of the scratched polymer substrate has been observed for both PMMA and PC, though their scratch damage modes are quite different. Frictional heating is the main reason of the temperature rise under the low scratch normal load, while the plastic deformation and severe damage are responsible for the temperature rise under high load level. Since the DSC results clearly show that the microstructures of PMMA and PC are altered, the temperature rise during the scratch process has to be considered for the further investigation of polymer scratch.

Keywords: Polymer; Scratch; Temperature rise; In-situ observation

1. Introduction

Polymeric materials have been widely consumed in automotive industry, data storage and optical products, etc. The scratch behavior of polymeric materials has drawn much attention due to their low resistance to surface deformation and damage [1-10]. Various scratch damage modes of polymeric materials have been observed [11-16]. Fish-scale and material removal have been observed for PP [16, 17] and TPO [18, 19]. Parabolic crack has been found during the scratch test of PS [20], epoxy [21] and diethylene glycol bis(allylcarbonate) [22]. Three different damage modes have been recognized for PMMA scratch under the progressive loading [23]. Cracking has also been discovered for polymer coating scratch [24-26]. Based on the experimental observation following the ASTM and ISO test standards [27, 28], Jiang et al. [29]

Download English Version:

<https://daneshyari.com/en/article/7002661>

Download Persian Version:

<https://daneshyari.com/article/7002661>

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