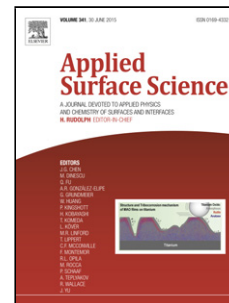


Accepted Manuscript

Title: Whiskers growth and self-healing in Ti-based metallic glasses during ion irradiation

Your article is registered as a regular item and is being processed for inclusion in a regular issue of the journal. If this is NOT correct and your article belongs to a Special Issue/Collection please contact k.maddala@elsevier.com immediately prior to returning your corrections.



Authors: Kun Zhang, Zheng Hu, Ziqiang Zhao, Bingchen Wei, Yansen Li, Yuhang Wei

PII: S0169-4332(17)33754-6
 DOI: <https://doi.org/10.1016/j.apsusc.2017.12.166>
 Reference: APSUSC 38036

To appear in: *APSUSC*

Received date: 24-7-2017
Revised date: 19-10-2017
Accepted date: 18-12-2017

Please cite this article as: { <https://doi.org/>

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.

Whiskers Growth and Self-healing in Ti-based Metallic Glasses during Ion Irradiation

Kun Zhang¹, Zheng Hu², Ziqiang Zhao³, Bingchen Wei^{1,*}, Yansen Li¹, Yuhang Wei¹

¹Key Laboratory of Microgravity (National Microgravity Laboratory), Institute of Mechanics, Chinese Academy of Sciences, Beijing 100190, China

²Science and Technology on Vehicle Transmission Laboratory, China North Vehicle Research Institute, Beijing 100072, China

³School of Physics, Peking University, Beijing 100871, China

Email: weibc@imech.ac.cn

Highlights

In this paper, Ti-based metallic glasses were subjected to a 20 MeV Cl⁴⁺ ion radiation under liquid-nitrogen cooling. Their responses, as well as effects of the electronic excitation and nucleus-nucleus collision were evaluated. The collision cascade during irradiation typically changes the structure by increasing the liquid-like zone, or the content of the free volume. However, along the ion incident depth, the structure change is inhomogeneous. Numerous whiskers appear and aggregate on the side of the irradiation surface, which are several micrometers away from the edge. This corresponds with the maximum collision depth obtained by the Monte Carlo simulation, where nuclear loss plays a dominant role. Moreover, the liquid-like zone continually forms, which add to the whiskers growth and subsequent self-healing. Results suggest that the irradiation-induced local shear stress combines with the well-localized liquid-like zone results in the observed phenomena. This study demonstrates that metallic glasses have high morphological instability under ion irradiation, which assets can pave new paths for their applications. We strongly believe the contribution of this study warrants its publication in the “Applied Surface Science”.

Download English Version:

<https://daneshyari.com/en/article/7835600>

Download Persian Version:

<https://daneshyari.com/article/7835600>

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