

## Accepted Manuscript

Title: Highly collective atomic transport mechanism in high-entropy glass-forming metallic liquids

Authors: Changjiu Chen, Kaikin Wong, Rithin P. Krishnan, Lei Zhifeng, Dehong Yu, Zhaoping Lu, Suresh M. Chathoth



PII: S1005-0302(18)30184-1  
DOI: <https://doi.org/10.1016/j.jmst.2018.09.008>  
Reference: JMST 1294

To appear in:

Received date: 18-4-2018  
Revised date: 10-6-2018  
Accepted date: 5-7-2018

Please cite this article as: Chen C, Wong K, Krishnan RP, Zhifeng L, Yu D, Lu Z, Chathoth SM, Highly collective atomic transport mechanism in high-entropy glass-forming metallic liquids, *Journal of Materials Science and Technology* (2018), <https://doi.org/10.1016/j.jmst.2018.09.008>

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.

# Highly collective atomic transport mechanism in high-entropy glass-forming metallic liquids

Changjiu Chen<sup>1</sup>, Kaikin Wong<sup>1</sup>, Rithin P. Krishnan<sup>1</sup>, Lei Zhifeng<sup>2</sup>, Dehong Yu<sup>3</sup>, Zhaoping Lu<sup>2</sup>, and Suresh M. Chathoth<sup>1,\*</sup>

<sup>1</sup>*Department of Physics, City University of Hong Kong, Kowloon Tong, Hong Kong, China*

<sup>2</sup>*State Key Laboratory for Advanced Metals and Materials, University of Science and Technology, Beijing, 100083, China*

<sup>3</sup>*Australian Nuclear Science and Technology Organization, Lucas Height, 2234, Australia*

\*Corresponding author. Dr. Suresh M. Chathoth, Ph.D.; Tel.: +852 3442 4967; Fax: +852 3442 0538; *Email address*: smavilac@cityu.edu.hk (S. M. Chathoth)

[Received 18 April 2018; Received in revised form 10 June 2018; Accepted 5 July 2018]

Quasielastic neutron scattering (QENS) has been used to study the atomic relaxation process and microscopic transport mechanism in high-entropy glass-forming metallic (HE-GFM) liquids. Self-intermediate scattering functions obtained from the QENS data show unusually large stretching, which indicates highly heterogeneous atomic dynamics in HE-GFM liquids. In these liquids, a group of atoms over a length scale of about 21 Å diffuses collectively even well above the melting temperature. However, the temperature dependence of diffusion process in one of the HE-GFM liquid is Arrhenius, but in the other HE-GFM liquid it is non-Arrhenius. Although the glass-forming ability of these HE-GFM liquids is very poor, the diffusion coefficients obtained from the QENS data indicate the long range atomic transport process is much slower than that of the best metallic glass-forming liquids at their melting temperatures.

**Keywords:** High-entropy alloy, Neutron scattering, Atomic relaxation, Diffusion

Download English Version:

<https://daneshyari.com/en/article/10155788>

Download Persian Version:

<https://daneshyari.com/article/10155788>

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