



Mechanical Response of Melt-Quenched Zeolitic Imidazolate Framework Glass to Sharp Contact Loading

Stepniewska, Malwina; Januchta, Kacper; Zhou, Chao; Qiao, Ang; Winther, Grethe; Smedskjær, Morten Mattrup; Yue, Yuanzheng

Publication date:
2019

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Stepniewska, M., Januchta, K., Zhou, C., Qiao, A., Winther, G., Smedskjær, M. M., & Yue, Y. (2019). *Mechanical Response of Melt-Quenched Zeolitic Imidazolate Framework Glass to Sharp Contact Loading*. Abstract from 25th International Congress on Glass, Boston, United States.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Mechanical Response of Melt-Quenched Zeolitic Imidazolate Framework Glass to Sharp Contact Loading

Malwina Stepniewska¹, Kacper Januchta¹, Chao Zhou¹, Ang Qiao¹, Grethe Winther², Morten M. Smedskjaer¹ and Yuanzheng Yue¹

¹Department of Chemistry and Bioscience, Aalborg University, DK-9220 Aalborg, Denmark

²Department of Mechanical Engineering, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark

Discovery of the new family of melt-quenched (MQ) glasses - zeolitic imidazolate framework (ZIF) glasses - has induced a substantial interest in exploring the nature and properties of these materials. Despite much progress in the understanding of ZIF glass formation and structure, their deformation behavior has not been well studied, especially, their fracture behavior has not yet been reported to the best of our knowledge. In this presentation, we report on the deformation and cracking behavior of MQ-ZIF-62 glasses. By employing both Vicker's microindentation and Berkovich nanoindentation techniques, we analyze the mechanical response of the ZIF glass to indentation at different load scales. Atomic force microscopy (AFM) analysis of indents reveals minimal pile up and shear bands on the indent faces, implying a high degree of local plastic deformation and densification. Despite a fully polymerized structure of ZIF glasses, analogous to that of silica glass, they exhibit indentation cracking patterns similar to those of 'normal' oxide glasses. We interpret this mechanical response of the ZIF glasses in terms of the nature of their chemical bonding and structural features, which are significantly different from those of other families of network glasses.