In-situ observation of the formation of indentation cracks in glass by means of synchrotron X-ray tomography

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Abstract

Damage caused by sharp contact loading at the surface of glass is a major fundamental problem in glass science, for the glass industry, and for end-users as well. Different microcracking patterns are observed, and cracks may form either on loading or on unloading depending on the glass composition. The driving forces associated with these cracks are intimately related to the elastic response, and to the permanent deformation processes, such as densification and isochorics shear. A specific mechanical testing set-up was used for the situ observation of the displacement field and crack formation during a Vickers indentation process by means of a synchrotron X-ray tomography. Results are discussed in the light of available analytical expressions for the indentation problem.

Keywords: Indentation cracks, in situ Xray tomography

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