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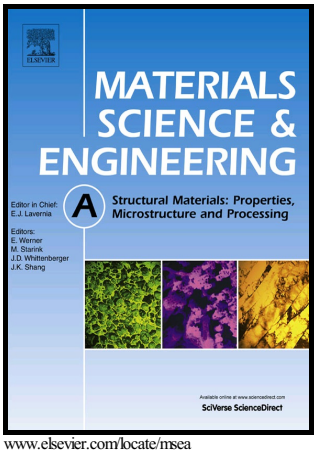

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Structural evolution in a metallic glass pillar upon compression

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Abstract

The *in-situ* observation of structural evolution of a metallic glass pillar during deformation is carried out in a high energy synchrotron X-ray source. The changes of the first maximum in structure factor, $S(q)$, reveal the evolution of atomic structure upon stress. The width of the first maximum in $S(q)$ increases as stress increasing during elastic deformation. After the elastic deformation, the serrated flow occurs, in which the width of the first maximum of $S(q)$ in the loading stage of the serration event also increases. The broadening of the first maximum in $S(q)$ means that the stress induces disordering of the glassy phase, which is because the densely packed clusters is separated into many loosely packed ones. This creates the excess free volumes.

Key words: Metallic glass; High-energy X-ray diffraction; Microindentation of pillar; Serration events; Structural evolution