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# Inherent Relation Between Atomic-Level Stresses and Nanoscale Spatial Heterogeneity in a Rejuvenated Bulk Metallic Glass

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**Abstract :** This study addresses the role of rejuvenation on the fluctuation of atomic-level stresses and nanoscale topological heterogeneity in ZrCuNiAl bulk metallic glass (BMG). Based on atomic force microscopy (AFM) results, the rejuvenation process leads to an increase in nanoscale spatial heterogeneity manifested by the intensification of the local viscoelastic response of the BMG nanostructure. It means that the rejuvenation process induces more loose-packing structures which behave towards an external load in a viscoelastic way. Hence, it is suggested that the alteration of such heterogeneity may be attributed to the variation of positional atomic rearrangement during the evolution of structural rejuvenation. On the other side, the synchrotron X-ray diffraction (XRD) results indicate that the rejuvenation intensifies the variation of internal stresses at the atomic level. This conclusion unfolds that the increase of atomic-level stresses during rejuvenation induces structural disordering and nanoscale heterogeneity in the amorphous material.

**Keywords :** bulk metallic glass, heterogeneity, rejuvenation, nanostructure
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