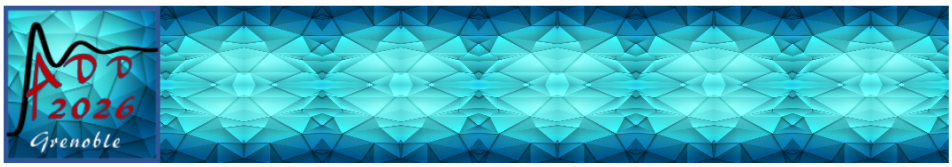

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Structural Fingerprints of Plasticity: Linking the Shear Transformation Zone Size to Pair Distribution Functions in Metallic Glasses

Content

To understand the interplay between local atomic structure and the plastic deformation process in metallic glasses remains a key challenge in materials science. In this work, we combine nanoindentation experiments with structural analysis based on pair distribution functions (PDFs) to explore how shear transformation zones (STZs) and activation volumes correlate with short- and medium-range order. Using statistical evaluation of so-called pop-in events, we estimate the characteristic size of STZs. Through synchrotron-based PDF measurements the structural fingerprint was assessed. Our results suggest that variations in atomic ordering influence the onset of plasticity, providing a quantitative link between mechanical response and structural motifs. This approach offers new insights into the fundamental mechanisms governing deformation in amorphous alloys and opens pathways for tailoring their properties through structural design.

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